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Amphibians and reptiles from two localities in the northern Andes of Colombia

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Abstract

The northern Andes are a geographically, climatically, and ecologically complex area that harbors a high number of species and presents a high level of endemism. However, the landscape of this region has been highly transformed by human activities, including agriculture, cattle grazing, urbanization, and recently, the construction of large infrastructure projects. This study presents a list of amphibians and reptiles compiled from field surveys carried out between 2006 and 2016 in the protected areas surrounding 2 hydroelectric projects located on the eastern flank of the northern Cordillera Central in Colombia. The checklist is comprised of 101 species (43 amphibians and 58 reptiles), including 17 endemic to Colombia and 4 threatened species. The high species density, high representativeness of the regional biodiversity, and high level of amphibian endemism make these 2 protected areas important for conservation of the regional herpetofauna.

Key words

Endemism; frogs; hydroelectric dam; lizards; snakes; species richness.

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Introduction

The Andes mountain range extends for 5000 km along the western coast of South America and 3 main domains are recognized: southern, central and northern Andes (Gregory-Wodzicki 2000). The northern Andes reach their maximum geomorphological complexity in Colombia, where 3 mountain chains (the Western, Central, and Eastern cordilleras), are separated by the sedimentary basins of the Cauca and Magdalena rivers (Kattan et al. 2004). Three major historical events have shaped the biological diversity in this region: (1) the uplift of mountain ranges in a complex series of orogenic processes generating new environments and causing vicariant events, (2) the final closure of the Isthmus of Panama that allowed the biotic interchange between 2 continents, and (3) the climatic fluctuations during the Pleistocene that lead to cycles of range contraction and expansion resulting in the fragmentation and isolation of natural populations, with subsequent speciation and radiation events (Duellman 1999, Kattan et al. 2004). Thus, the diversity of ecological settings generated by this physiographic complexity has made the northern Andes one of the most biodiverse regions on the planet with an exceptional number of endemic plants and vertebrates (Fjeldsa 1994, Duellman 1999, Myers et al. 2000).

The northern Andes are also under continuous and intense anthropogenic pressure. About 70% of the human

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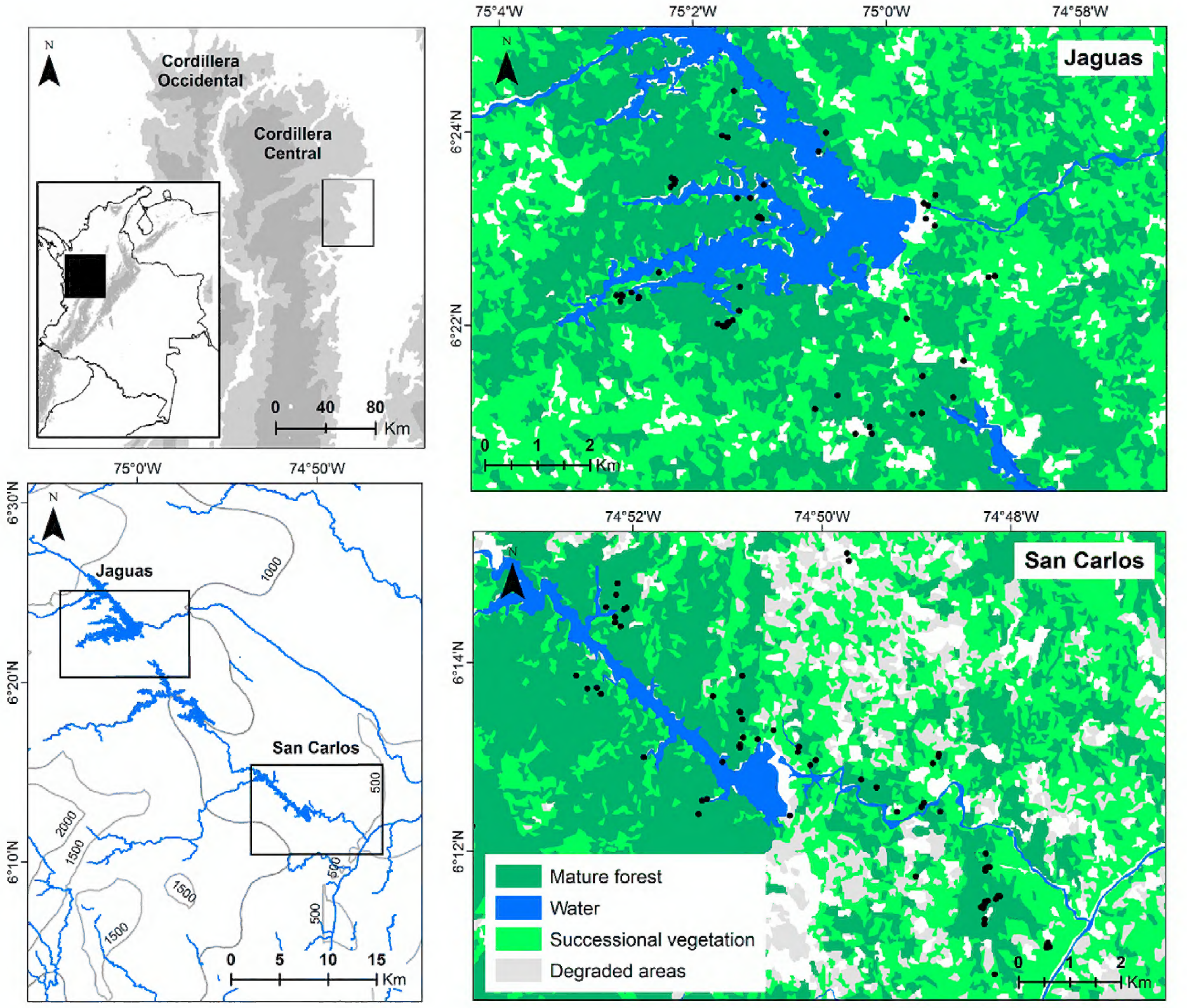

Figures 1. Study area showing the location in Colombia and the northern Cordillera Central. On the right, the two localities (Jaguas and San Carlos) are expanded and black dots represent the sampling sites. Colors represent cover type.

population in Colombia is concentrated in this region and agricultural activities, cattle grazing and infrastructure development (i.e. urbanization, dam construction, and roads) are among the main causes of habitat loss and fragmentation (Etter and van Wyngaarden 2000, Fjeldsa et al. 2005). On the eastern flank of the northern Cordillera Central, several hydroelectric projects involving dam constructions, roads, and power lines were developed in the last 2 decades. As a mitigation strategy, Colombia's environmental legislation demands that these large infrastructure projects compensate the negative impacts through the implementation of effective conservation and restoration plans by preserving and monitoring the biodiversity in the surrounding areas (Minambiente 2012). As a consequence, these habitats, as virtually the only remnants left, represent a last-minute opportunity to make complete species checklists for the northern portion of the central Andes of Colombia.

Based on more than a decade of field surveys, we provide the species list of amphibians and reptiles found in the protected areas of 2 main hydroelectric projects located on the northeastern Cordillera Central in Colombia.

Methods

Study sites. This study was conducted in the northern Andes at 2 sites above 500 m elevation in the Cordillera Central in Antioquia department, Colombia (Fig. 1). The Jaguas site (06°26′06.0″ N, 075°00′57.6″ W) includes a 4000 ha private protected area with habitats in different successional stages, within the premontane wet forest life zone (bmh-PM, Holdridge 1964). The altitude ranges between 1100 and 1300 m above sea level. The temperature ranges between 18 and 24 °C and the annual rainfall between 2000 and 4000 mm. The San Carlos site (06°12′57.6″ N, 074°51′21.6″ W) includes a private protected area of 3000 ha, within the tropical moist forest life zone (bh-T, Holdridge 1964). The altitude is between 600 and 950 m above sea level. It has a mean temperature of 24 °C and the annual rainfall ranges between 2000 and 4000 mm. The 2 sites are under a bimodal rainfall regime with 1 rainy season between March and May and 1 between September and November (Poveda et al. 2005).

Data collection. Between 2006 and 2016, the complete species inventory has been an ongoing goal as part of the

monitoring plan implemented by the company ISAGEN S.A. Amphibians and reptiles were searched for in all possible microhabitats including diurnal and nocturnal sampling events during rainy, dry, and transition seasons. In total, 49 sampling points were distributed in different vegetation types.

Collected specimens were euthanized with 2% Roxicain®, fixed in 10% formalin solution, and preserved in 70% ethanol following the protocol by Cortez et al. (2006). Voucher specimens are deposited in the Museo de Herpetología Universidad de Antioquia (MHUA), in Medellín, Colombia (Instituto Alexander von Humboldt registry # 80, since the year 2000). All procedures were conducted under permit No. 112–0046 granted by the Corporación Autónoma Regional CORNARE. We list the collected and examined specimens in Table 1 (amphibians) and 2 (reptiles). All coordinates use the WGS84 datum.

Amphibian nomenclature follows Frost (2016) and reptile nomenclature follows Uetz and Hošek (2016). We reviewed the original descriptions of the species along with the MHUA reference collection to corroborate the taxonomic identifications. We included in the list only the species having voucher specimens or photographs that allow unambiguous identification of taxa. We follow the species distribution provided by IUCN (2016) for amphibians and Uetz and Hošek (2016) for reptiles.

Results

Amphibians

From the 2 protected areas, we report 43 amphibian species representing 13 families and 25 genera (Table 3). In the protected area of the Jaguas locality, we report 37 amphibian species from 11 families. The most diverse lineages were Hylidae with 12 species (32%) and Craugastoridae with 6 species (16%). Eleven species are endemic to Colombia (30%), and according to the IUCN Red Lists, 1 is classified as Endangered, 2 as Vulnerable, and 1 as Near Threatened (IUCN 2016). In comparison, the San Carlos site has 34 amphibian species grouped in 11 families. Again, the most diverse groups were Hylidae with 11 species (32%) and Craugastoridae with 6 species (18%). Eleven species from San Carlos locality are endemic to Colombia (32%) and 2 are listed as Vulnerable (IUCN 2016). Jaguas and San Carlos localities shared 28 amphibian species.

Rheobates pseudopalmatus (Rivero & Serna, 2000): Figure 2A

Colostethus pseudopalmatus Rivero and Serna 2000: 55.
Rheobates pseudopalmatus — Grant et al. 2006: 159.

Material examined. Table 1.

A moderate-sized frog with cryptic, brown or gray dorsal coloration; dorsal skin granular posteriorly; toe webbing extensive; finger I shorter than finger II; pale oblique lateral stripe present or absent and pale dorsolateral and ventrolateral stripes absent. Rivero and Serna (2000) proposed *R. pseudopalmatus* as sister species of *R. palmatus*. However, Grant et al. (2006) question the validity of morphological characters used to distinguish this species from *R. palmatus* and consider that both species could be conespecific given that the type locality of *R. pseudopalmatus* (Amalfi, Antioquia) lies within the known distribution of *R. palmatus* on the eastern slope of the Central Cordillera. Here, we assign our samples to *R. pseudopalmatus* according to Muñoz-Ortíz et al. (2015) who suggested, based on molecular information, that this species could be redescribed restricting *R. pseudopalmatus* to the Central Cordillera and *R. palmatus* to the Eastern Cordillera.

Rhinella alata (Thominot, 1884): Figure 2B

Bufo alatus Thominot 1884: 151.
Rhinella alata — Frost et al. 2006: 365

Material examined. Table 1.

Rhinella alata is a small-sized toad with skin of dorsum bearing a mixture of warts, pustules and minute tubercles; supraorbital crests low and thick, continuous with preorbital crests; dorsal coloration ranging from light gray or brown to dark gray or brown, with irregular black and yellowish marks (a mid-dorsal line is usually present) and coloration of ventral surfaces cream to yellowish-cream with irregular darker marks arranged in diverse patterns (dos Santos et al. 2015). Populations of *Rhinella margaritifera* species group distributed on Magdalena river valley have commonly been referred to as *R. margaritifera* (see Burbano et al. 2016). Nevertheless, although *R. alata* is closely related to *R. margaritifera* (distributed in the upper Amazon basin of Peru and Ecuador), this species may be easily distinguished by differences in body size (*R. margaritifera* being significant larger than *R. alata*) and the relative size of the cranial crest (larger in *R. margaritifera* than in *R. alata*).

Rhinella horribilis (Wiegmann, 1833): Figure 2C

Bufo horribilis Wiegmann 1833: 654.
Bufo marinus — Peters 1873: 618.
Rhinella horribilis — Acevedo et al. 2016: 584.

Material examined. Table 1.

Recently, Acevedo et al. (2016) proposed that populations of *Rhinella marina* (Linnaeus, 1758) distributed west of the Andean cordilleras should be considered a different species from the eastern populations. Therefore, the eastern populations should maintain the name *R. marina* and *R. horribilis* should be revalidated for the western populations. According to this concept, the Magdalena river valley populations correspond to *R. horribilis* (Wiegmann, 1833).

Cochranella resplendens (Lynch & Duellman, 1973): Figure 2D

Centrolenella resplendens Lynch and Duellman 1973: 51.
Cochranella resplendens — Ruíz-Carranza and Lynch 1991: 23.

Material examined. Table 1.

Espadarana prosoblepon (Boettger, 1892): Figure 2E

Hyla prosoblepon Boettger 1892: 45.
Centrolene prosoblepon Noble 1924: 66.

Table 1. Voucher list of amphibians of Jaguas and San Carlos hydroelectric protected areas with geographic coordinates.

Taxon	Voucher	Latitude	Longitude
AMPHIBIA			
ANURA			
Aromobatidae			
Rheobates pseudopalmatus	MHUA-A 07845	6.38871	-75.02555
	MHUA-A 08485	6.36725	-75.02723
	MHUA-A 08491	6.39128	-75.03640
	MHUA-A 09425	6.39128	-75.03640
	MHUA-A 09426	6.36725	-75.02723
	MHUA-A 09538	6.39128	-75.03640
	MHUA-A 09758	6.29817	-74.91981
	MHUA-A 10599	6.15750	-75.04325
	MHUA-A 10641	6.15750	-75.04325
	MHUA-A 10643	6.15829	-75.04531
	MHUA-A 10644	6.15829	-75.04531
	MHUA-A 10646	6.15829	-75.04531
	MHUA-A 10650	6.15829	-75.04531
	MHUA-A 10651	6.15750	-75.04325
	MHUA-A 10652	6.15763	-75.04316
	MHUA-A 10653	6.15763	-75.04316
	MHUA-A 10654	6.15829	-75.04531
	MHUA-A 10662	6.15829	-75.04531
	MHUA-A 10726	6.20908	-74.85436
Bufonidae			
Rhinella alata	MHUA-A 09731	6.32711	-75.01186
	MHUA-A 09732	6.32758	-75.01176
	MHUA-A 09739	6.27667	-74.93102
	MHUA-A 09766	6.29231	-75.03969
	MHUA-A 08492	6.39128	-75.03640
	MHUA-A 06979	6.30032	-75.06698
	MHUA-A 07930	6.38871	-75.02555
	MHUA-A 08225	6.36725	-75.02723
	MHUA-A 08330	6.36725	-75.02723
	MHUA-A 08486	6.39128	-75.03640
	MHUA-A 10671	6.18324	-74.79362
	MHUA-A 10673	6.18325	-74.79362
	MHUA-A 10674	6.18280	-74.19330
	MHUA-A 10676	6.19224	-74.80183
	MHUA-A 10677	6.15671	-75.04108
	MHUA-A 10679	6.18336	-74.79308
Rhinella horribilis	MHUA-A 10722	6.13321	-75.09676
Centrolenidae			
Cochranella resplendens	MHUA-A 9540	6.36725	-75.02723
Espadarana prosoblepon	MHUA-A 06978	6.30032	-75.06698
	MHUA-A 07124	6.36699	-75.02892
	MHUA-A 07420	6.36930	-75.02520
	MHUA-A 07421	6.36930	-75.02520
	MHUA-A 08212	6.38871	-75.02335
	MHUA-A 08213	6.38871	-75.02335
	MHUA-A 08214	6.38871	-75.02335
	MHUA-A 08226	6.36725	-75.02723
	MHUA-A 08230	6.39202	-75.03650
	MHUA-A 08329	6.36725	-75.02723
	MHUA-A 08338	6.39115	-75.03641
	MHUA-A 08493	6.39128	-75.03640
	MHUA-A 09723	6.32845	-75.01171
	MHUA-A 09724	6.32734	-75.01160
	MHUA-A 09729	6.32734	-75.01160
	MHUA-A 09730	6.32734	-75.01160
	MHUA-A 10629	6.38518	-75.02140
	MHUA-A 10631	6.37172	-75.04534
	MHUA-A 10632	6.35150	-74.99528
	MHUA-A 10633	6.35150	-74.99528
	MHUA-A 10634	6.35150	-74.99528
	MHUA-A 10635	6.19176	-74.80257
	MHUA-A 10636	6.38518	-75.02140
	MHUA-A 10638	6.35150	-74.99528
	MHUA-A 10681	6.36662	-75.02798
	MHUA-A 10686	6.35150	-74.99528
	MHUA-A 10688	6.19176	-74.80257
Hyalinobatrachium aureoguttatum	MHUA-A 07075	6.23108	-74.87661
	MHUA-A 07076	6.23108	-74.87661
Hyalinobatrachium fleischmanni	MHUA-A 07198	6.21734	-74.81262
Rulyrana susatamai	MHUA-A 09539	6.36725	-75.02723
Sachatamia punctulata	MHUA-A 09728	6.32866	-75.01155
	MHUA-A 09764	6.29817	-74.91981
	MHUA-A 10803	6.28806	-74.82722
	MHUA-A 10804	6.28806	-74.82722
Sachatamia sp.	MHUA-A 07123	6.37141	-75.04253
	MHUA-A 07842	6.38871	-75.02555
	MHUA-A 07844	6.38871	-75.02555
	MHUA-A 08205	6.39202	-75.03650
	MHUA-A 08216	6.38539	-75.02202
	MHUA-A 08217	6.39170	-75.03626
	MHUA-A 08229	6.39202	-75.03650
	MHUA-A 08231	6.39202	-75.03650
	MHUA-A 08232	6.39202	-75.03650
	MHUA-A 08233	6.39202	-75.03650
	MHUA-A 08336	6.39115	-75.03641
	MHUA-A 08337	6.39115	-75.03641
	MHUA-A 10615	6.37172	-75.04534
	MHUA-A 10682	6.36662	-75.02798
Craugastoridae			
Craugastor metriosistus	MHUA-A 10468	6.24144	-74.86976
	MHUA-A 10507	6.23974	-74.86880
	MHUA-A 10586	6.15763	-75.04316
	MHUA-A 10587	6.36767	-75.02635
	MHUA-A 10588	6.38518	-75.02140
	MHUA-A 10589	6.24144	-74.86976
	MHUA-A 10590	6.20938	-74.85352
	MHUA-A 10656	6.20908	-74.85436
	MHUA-A 10660	6.20908	-74.85436
	MHUA-A 10800	6.28806	-74.82722
	MHUA-A 10808	6.15844	-75.04433
	MHUA-A 10809	6.15865	-75.04447
Pristimantis fallax	MHUA-A 07125	6.20671	-74.85500
	MHUA-A 10523	6.20908	-74.85436
Pristimantis gaigei	MHUA-A 07118	6.24320	-74.87138
	MHUA-A 07208	6.21854	-74.83727
	MHUA-A 07209	6.21626	-74.83435
	MHUA-A 08348	6.19062	-74.80474
	MHUA-A 08497	6.36725	-75.02723
	MHUA-A 09750	6.27681	-74.93975
	MHUA-A 09751	6.27679	-74.93085
	MHUA-A 10495	6.17844	-74.80273
	MHUA-A 10516	6.19224	-74.80183
	MHUA-A 10802	6.28806	-74.82722
Pristimantis jaguensis	MHUA-A 07026	6.38871	-75.02335
	MHUA-A 07027	6.38871	-75.02335
	MHUA-A 07028	6.38871	-75.02335
	MHUA-A 07030	6.38871	-75.02335
	MHUA-A 07031	6.38871	-75.02335
	MHUA-A 07032	6.38871	-75.02335
	MHUA-A 07033	6.38871	-75.02335
	MHUA-A 07238	6.38871	-75.02335
	MHUA-A 07246	6.38871	-75.02335
	MHUA-A 07248	6.38871	-75.02335
	MHUA-A 07249	6.38871	-75.02335
	MHUA-A 07250	6.38871	-75.02335
	MHUA-A 07251	6.38871	-75.02335
	MHUA-A 07252	6.38871	-75.02335
	MHUA-A 07253	6.38871	-75.02335
	MHUA-A 07254	6.38871	-75.02335
	MHUA-A 07255	6.38871	-75.02335
	MHUA-A 07256	6.35812	-74.99367
	MHUA-A 07257	6.35812	-74.99367

Continued

Table 1. *Continued.*

Taxon	Voucher	Latitude	Longitude
	MHUA-A 07415	6.38871	-75.02335
	MHUA-A 07417	6.38871	-75.02335
	MHUA-A 07837	6.38871	-75.02555
	MHUA-A 10518	6.36662	-75.02798
Pristimantis penelopus	MHUA-A 07034	6.34818	-75.00237
	MHUA-A 07035	6.34818	-75.00237
	MHUA-A 07424	6.36930	-75.02520
	MHUA-A 08588	6.36728	-75.02697
	MHUA-A 09727	6.32860	-75.01146
	MHUA-A 09733	6.32831	-75.01188
	MHUA-A 09734	6.32866	-75.01155
	MHUA-A 09754	6.29647	-74.91934
	MHUA-A 09756	6.29771	-74.91969
	MHUA-A 09760	6.29817	-74.91981
	MHUA-A 10461	6.15750	-75.04325
	MHUA-A 10462	6.36697	-75.02733
	MHUA-A 10463	6.36701	-75.02718
	MHUA-A 10464	6.37194	-75.04556
	MHUA-A 10466	6.36662	-75.02798
	MHUA-A 10467	6.15728	-75.42740
	MHUA-A 10469	6.35150	-74.99528
	MHUA-A 10470	6.35150	-74.99528
	MHUA-A 10476	6.35150	-74.99528
	MHUA-A 10478	6.36662	-75.02798
	MHUA-A 10479	6.37188	-75.04533
	MHUA-A 10480	6.35150	-74.99528
	MHUA-A 10482	6.36697	-75.02733
	MHUA-A 10483	6.38518	-75.02140
	MHUA-A 10485	6.15822	-75.04457
	MHUA-A 10486	6.15723	-75.04282
	MHUA-A 10487	6.36701	-75.02718
	MHUA-A 10488	6.37172	-75.04534
	MHUA-A 10490	6.15754	-75.04295
	MHUA-A 10491	6.36662	-75.02798
	MHUA-A 10494	6.37188	-75.04533
	MHUA-A 10496	6.15829	-75.04531
	MHUA-A 10497	6.15773	-75.04398
	MHUA-A 10500	6.37158	-75.04247
	MHUA-A 10501	6.38518	-75.02140
	MHUA-A 10502	6.36662	-75.02798
	MHUA-A 10504	6.20908	-74.85436
	MHUA-A 10505	6.20908	-74.85436
	MHUA-A 10506	6.15849	-75.04496
	MHUA-A 10510	6.15750	-75.04325
	MHUA-A 10511	6.15829	-75.04531
	MHUA-A 10513	6.35150	-74.99528
	MHUA-A 10515	6.15723	-75.04282
	MHUA-A 10517	6.15784	-75.04414
	MHUA-A 10519	6.37188	-75.04533
	MHUA-A 10520	6.36662	-75.02798
	MHUA-A 10527	6.36697	-75.02733
	MHUA-A 10559	6.15829	-75.04531
	MHUA-A 10560	6.37194	-75.04556
	MHUA-A 10592	6.20908	-74.85436
	MHUA-A 10724	6.20908	-74.85436
	MHUA-A 10725	6.20908	-74.85436
	MHUA-A 10811	6.13846	-75.06631
Pristimantis taeniatus	MHUA-A 07211	6.18737	-74.80460
	MHUA-A 07212	6.19743	-74.80363
	MHUA-A 07215	6.21569	-74.81371
	MHUA-A 07234	6.35447	-74.98836
	MHUA-A 07423	6.36930	-75.02520
	MHUA-A 08484	6.36725	-75.02723
	MHUA-A 09537	6.37540	-74.98122
	MHUA-A 09757	6.29681	-74.91933
	MHUA-A 09769	6.29371	-75.04156
	MHUA-A 09770	6.29371	-75.04156
	MHUA-A 10471	6.15829	-75.04379
	MHUA-A 10503	6.15801	-75.04480
	MHUA-A 10522	6.15829	-75.04379
	MHUA-A 10525	6.15829	-75.04379
	MHUA-A 10591	6.24279	-74.86818
Pristimantis viejas	MHUA-A 07058	6.34818	-75.00237
	MHUA-A 07135	6.24739	-74.86938
	MHUA-A 08335	6.39202	-75.03650
	MHUA-A 08341	6.38528	-75.02158
	MHUA-A 08538	6.40999	-75.14157
	MHUA-A 09742	6.29610	-74.91944
	MHUA-A 09743	6.27721	-74.92910
	MHUA-A 09744	6.27721	-74.92910
	MHUA-A 09755	6.29631	-74.91931
	MHUA-A 09759	6.29648	-74.91931
	MHUA-A 10465	6.38518	-75.02140
	MHUA-A 10474	6.37198	-75.04549
	MHUA-A 10475	6.15750	-75.04325
	MHUA-A 10521	6.37198	-75.04549
Dendrobatidae			
Colostethus inguinalis	MHUA-A 00223	6.21591	-74.85079
	MHUA-A 07072	6.22342	-74.84733
	MHUA-A 10645	6.18324	-74.79362
	MHUA-A 10600	6.18370	-74.79353
	MHUA-A 10642	6.18370	-74.79353
	MHUA-A 10647	6.19976	-74.80432
	MHUA-A 10648	6.18324	-74.79362
	MHUA-A 10649	6.24307	-74.86771
	MHUA-A 10661	6.18370	-74.79353
Colostethus aff. *fraterdanieli*	MHUA-A 07396	6.38871	-75.02335
	MHUA-A 07411	6.38871	-75.02335
	MHUA-A 07416	6.36930	-75.02520
	MHUA-A 07419	6.38871	-75.02335
	MHUA-A 08472	6.38528	-75.02158
	MHUA-A 08587	6.36728	-75.02697
	MHUA-A 09533	6.36725	-75.02723
	MHUA-A 09534	6.36725	-75.02723
	MHUA-A 09535	6.36725	-75.02723
	MHUA-A 09536	6.38537	-75.02166
Dendrobates truncatus	MHUA-A 08223	6.19055	-74.80480
	MHUA-A 07410	6.22020	-74.84713
	MHUA-A 08210	6.19570	-74.81670
	MHUA-A 09740	6.27738	-74.92780
	MHUA-A 10695	6.18360	-74.79343
Eleutherodactylidae			
Diasporus anthrax	MHUA-A 07237	6.34818	-75.00237
Diasporus gularis	MHUA-A 07258	6.38871	-75.02335
	MHUA-A 07405	6.38871	-75.02335
	MHUA-A 07406	6.38871	-75.02335
	MHUA-A 07407	6.38871	-75.02335
	MHUA-A 07412	6.38871	-75.02335
	MHUA-A 07413	6.38871	-75.02335
	MHUA-A 07839	6.38871	-75.02555
	MHUA-A 08211	6.38871	-75.02335
	MHUA-A 08494	6.38528	-75.02158
	MHUA-A 08496	6.39128	-75.03640
	MHUA-A 10593	6.38518	-75.02140
	MHUA-A 10594	6.20908	-74.85436
	MHUA-A 10595	6.20908	-74.85436
	MHUA-A 10794	6.37341	-75.02509
Hylidae			
Boana boans	MHUA-A 07193	6.22895	-74.87296
	MHUA-A 07838	6.38871	-75.02555
	MHUA-A 07840	6.36664	-75.02746
	MHUA-A 09505	6.36081	-74.98657
	MHUA-A 09752	6.28320	-74.92413
	MHUA-A 10564	6.19175	-74.80257
Boana xerophylla	MHUA-A 10567	6.19725	-74.80433
	MHUA-A 10566	6.19725	-74.80433

Continued

Table 1. *Continued.*

Taxon	Voucher	Latitude	Longitude
	MHUA-A 10568	6.19725	-74.80433
	MHUA-A 10569	6.19725	-74.80433
	MHUA-A 10571	6.18406	-74.79338
Dendropsophus ebraccatus	MHUA-A 07196	6.19744	-74.80397
	MHUA-A 10692	6.19725	-74.80433
	MHUA-A 10528	6.19725	-74.80433
	MHUA-A 10529	6.35171	-74.99379
	MHUA-A 10532	6.35171	-74.99379
	MHUA-A 10533	6.35171	-74.99379
	MHUA-A 10535	6.19725	-74.80433
	MHUA-A 10538	6.19725	-74.80433
	MHUA-A 10542	6.19725	-74.80433
	MHUA-A 10544	6.19725	-74.80433
	MHUA-A 10551	6.19725	-74.80433
	MHUA-A 10553	6.19725	-74.80433
	MHUA-A 10555	6.35171	-74.99379
	MHUA-A 10557	6.35171	-74.99379
Dendropsophus norandinus	MHUA-A 08235	6.39202	-75.03650
	MHUA-A 08488	6.39128	-75.03640
	MHUA-A 08589	6.39214	-75.03689
	MHUA-A 08590	6.39214	-75.03689
	MHUA-A 08591	6.39214	-75.03689
	MHUA-A 10530	6.15784	-75.04414
	MHUA-A 10531	6.15784	-75.04414
	MHUA-A 10534	6.15750	-75.04325
	MHUA-A 10536	6.15801	-75.04480
	MHUA-A 10537	6.15784	-75.04414
	MHUA-A 10539	6.36798	-74.99639
	MHUA-A 10540	6.36798	-74.99639
	MHUA-A 10541	6.15750	-75.04325
	MHUA-A 10543	6.15850	-75.04436
	MHUA-A 10545	6.15829	-75.04531
	MHUA-A 10546	6.15742	-75.04264
	MHUA-A 10547	6.15750	-75.04325
	MHUA-A 10548	6.15754	-75.04295
	MHUA-A 10549	6.36798	-74.99639
	MHUA-A 10550	6.36798	-74.99639
	MHUA-A 10554	6.36798	-74.99639
	MHUA-A 10561	6.15850	-75.04436
	MHUA-A 10562	6.15784	-75.04414
Dendropsophus subocularis	MHUA-A 07408	6.38871	-75.02335
	MHUA-A 07409	6.38871	-75.02335
	MHUA-A 07834	6.38871	-75.02555
	MHUA-A 08206	6.39202	-75.03650
	MHUA-A 08339	6.39128	-75.03640
	MHUA-A 08340	6.39128	-75.03640
	MHUA-A 08490	6.39128	-75.03640
Hyloscirtus palmeri	MHUA-A 06977	6.30032	-75.06698
	MHUA-A 07073	6.23108	-74.84733
	MHUA-A 09504	6.36081	-74.98657
	MHUA-A 10563	6.15766	-75.04323
	MHUA-A 10693	6.23974	-74.86880
	MHUA-A 10805	6.15665	-75.04128
	MHUA-A 10810	6.15865	-75.04447
Phyllomedusa venusta	MHUA-A 07121	6.21284	-74.82631
	MHUA-A 07195	6.22895	-74.87296
	MHUA-A 10556	6.19725	-74.80433
	MHUA-A 10581	6.19725	-74.80433
	MHUA-A 10582	6.19725	-74.80433
	MHUA-A 10583	6.19725	-74.80433
	MHUA-A 10584	6.19725	-74.80433
	MHUA-A 10585	6.15781	-75.04087
Scinax sp.	MHUA-A 07843	6.38871	-75.02555
	MHUA-A 08228	6.36081	-74.98657
Scinax rostratus	MHUA-A 07233	6.35812	-74.99367
	MHUA-A 10799	6.28806	-74.82722
Scinax ruber	MHUA-A 01685	6.49061	-74.83683
	MHUA-A 01686	6.49061	-74.83683
	MHUA-A 09500	6.36081	-74.98657
Smilisca phaeota	MHUA-A 08539	6.40999	-75.14157
	MHUA-A 09503	6.36081	-74.98657
	MHUA-A 09746	6.27700	-74.92966
	MHUA-A 09761	6.29143	-74.93671
	MHUA-A 09762	6.29143	-74.93671
	MHUA-A 09767	6.29243	-75.04211
	MHUA-A 10572	6.15743	-75.04177
	MHUA-A 10573	6.38518	-75.02140
	MHUA-A 10574	6.24045	-74.86977
	MHUA-A 10575	6.24045	-74.86977
	MHUA-A 10576	6.35171	-74.99379
	MHUA-A 10577	6.24045	-74.86977
	MHUA-A 10578	6.35171	-74.99379
	MHUA-A 10579	6.35171	-74.99379
	MHUA-A 10580	6.15850	-75.04436
	MHUA-A 10727	6.20908	-74.85436
Leptodactylidae			
Engystomops pustulosus	MHUA-A 09726	6.32913	-75.01398
	MHUA-A 10602	6.18406	-74.79338
	MHUA-A 10603	6.19725	-74.80433
	MHUA-A 10604	6.19725	-74.80433
	MHUA-A 10605	6.19725	-74.80433
	MHUA-A 10606	6.19725	-74.80433
Leptodactylus colombiensis	MHUA-A 07197	6.19144	-74.80397
	MHUA-A 09501	6.39128	-75.03640
	MHUA-A 10806	6.15651	-75.04146
	MHUA-A 10807	6.15651	-75.04146
Leptodactylus fuscus	MHUA-A 01687	6.49061	-74.83683
	MHUA-A 10598	6.38747	-74.99274
	MHUA-A 10790	6.38788	-74.99348
	MHUA-A 10791	6.38788	-74.99348
CAUDATA			
Plethodontidae			
Bolitoglossa ramosi	MHUA-A 07899	6.39100	-75.02100
GYMNOPHIONA			
Caeciliidae			
Caecilia thompsoni	MHUA-A 07192	6.62890	-75.66244
	MHUA-A 07115	6.51013	-75.04172
Siphonopidae			
Microcaecilia pricei	MHUA-A 10728	6.29648	-74.82229
Rhinatrematidae			
Epicrionops parkeri	MHUA-A 07191	6.22895	-74.87296
	MHUA-A 10720	6.20938	-74.85352

Espadarana prosoblepon — Guayasamin et al. 2009: 33.

Material examined. Table 1.

Hyalinobatrachium aureoguttatum (Barrera-Rodríguez & Ruíz-Carranza, 1989): Figure 2F

Centrolenella aureoguttata Barrera-Rodríguez and Ruíz-Carranza 1989: 77.

Hyalinobatrachium aureoguttatum — Ruíz-Carranza and Lynch 1991: 23.

Material examined. Table 1.

Small glass frog which exhibits complete ventral transparency; transparent pericardium; white hepatic and visceral peritonea; white bones; iris silvery at the center, yellow at the edges with numerous black spots (Guayasamin et al. 2009). *Hyalinobatrachium aureoguttatum* is superficially similar to *H. valeroi*. Nevertheless, in preservative *H. aureoguttatum* differs from *H. valeroi* in having usually either well-defined rounded spots or elongate blotches of bright white on yellow background

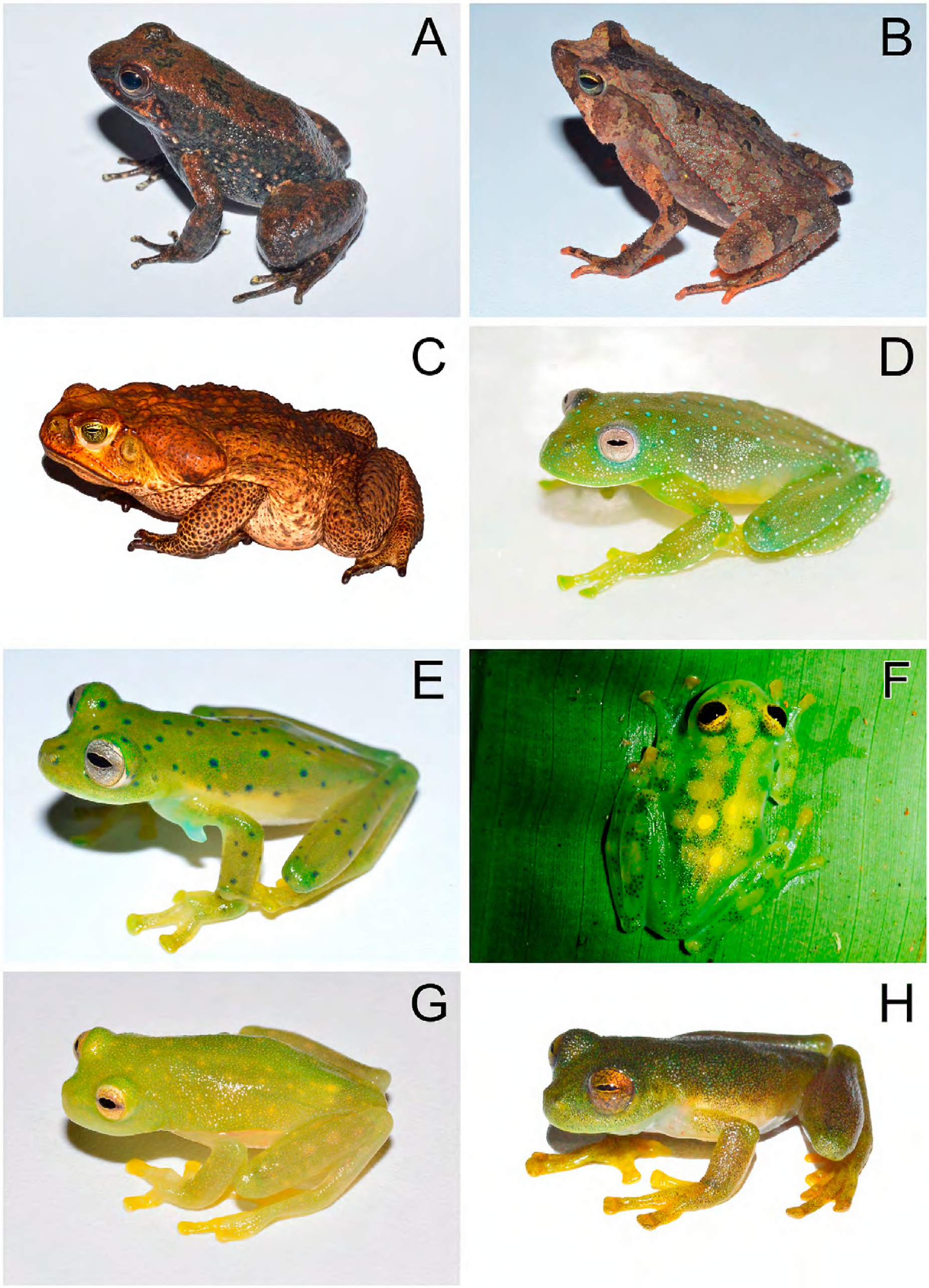

Figure 2. Amphibian species present in Jaguas and San Carlos hydroelectric protected areas. **A:** *Rheobates pseudopalmatus* MHUAA 8491. **B:** *Rhinella alata* MHUAA 8486. **C:** *Rhinella horribilis* MHUAA 10722. **D:** *Cochranella resplendens* MHUAA 9540. **E:** *Espadarana prosoblepon* MHUAA 8493. **F:** *Hyalinobatrachium aureogutattum* MHUAA 7075. **G:** *Hyalinobatrachium fleischmanni* MHUAA 8176. **H:** *Rulyrana susatamai* MHUAA 10684.

which correspond to clumps of iridophores (absent in *H. valeroi*).

Hyalinobatrachium fleischmanni (Boettger, 1893): Figure 2

Hylella fleischmann Boettger 1893: 251.
Hyalinobatrachium fleischmanni — Ruiz-Carranza and Lynch 1991: 24.

Material examined. Table 1.

Rulyrana susatamai (Ruíz-Carranza & Lynch, 1995): Figure 2H

Cochranella susatamai Ruíz-Carranza and Lynch 1995): 62.
Rulyrana susatamai — Guayasamin et al. 2009: 34.

Material examined. Table 1.

Sachatamia punctulata (Ruiz-Carranza & Lynch, 1995): Figure 3A

Cochranella punctulata Ruiz-Carranza and Lynch 1995: 4.
Sachatamia punctulata — Guayasamin et al. 2009: 36.

Material examined. Table 1.

***Sachatamia* sp.**: Figure 3B

Material examined. Table 1.

Craugastor metriosistus Ospina-Sarria, Angarita-Sierra & Pedroza-Banda, 2015: Figure 3C

Craugastor metriosistus Ospina-Sarria et al. 2015: 165.

Material examined. Table 1.

A medium-sized frog characterized by having extensive toe webbing and a uniformly reddish brown coloration on the posterior surfaces of the thighs. *Craugastor metriosistus* differ from *C. longirostris* and *C. raniformis* (the latter also distributed in the Magdalena river valley) in having the throat with median white gular stripe and dark coloration on either side (throat with spotted pattern or short lines in *C. longirostris* and white to cream in *C. raniformis*), in having posterior surfaces of the thighs reddish brown (dark to reddish brown with small and conspicuous pale spots in *C. raniformis*), and in having webbing extending to the proximal portion of the distal subarticular tubercle on the outer side of toe III (webbing extends to middle portion between basal and distal subarticular tubercle on the outer side of toe III in *C. raniformis* and *C. longirostris*; Ospina-Sarria et al. 2015).

Pristimantis fallax (Lynch & Rueda-Almonacid, 1999): Figure 3D

Eleutherodactylus fallax Lynch and Rueda-Almonacid 1999: 308.
Pristimantis fallax — Hedges et al. 2008: 118.

Material examined. Table 1.

Pristimantis fallax is a moderate size frog with a shagreen dorsum; finger I longer than finger II; toe V slightly longer than toe III; absence of toe webbing and broad disks on outer fingers. The most distinctive feature of *P. fallax* is the coloration pattern of the throat consisting in a lateral portion reticulated with gray to black, defining cream central raphe, a feature shared with *Craugastor fitzingeri*. Although superficially resembling *C. fitzingeri*, *P. fallax* is easily distinguished in having toe V slightly longer than toe III (toe III slightly longer than toe V in *C. fitzingeri*), absence of webbing on toes (basally webbed in *C. fitzingeri*), and by having the posterior surfaces of the thighs unicolor (with pale spots in *C. fitzingeri*).

Pristimantis gaigei (Dunn, 1931): Figure 3E

Lithodytes gaigei Dun 1931: 387.
Pristimantis gaigeae — Hedges et al. 2008: 120.

Material examined. Table 1.

Pristimantis gaigei is a small to medium-sized frog characterized by having a distinct tympanum; annulus partially concealed dorsally and posteriorly by supratympanic fold; skin of dorsal surfaces shagreened; skin of venter smooth or feebly granular along lateral and posterior borders of ventral disk; discoidal folds and prominent arm slender (Lynch 1980). This species is easily distinguished from related species (i.e., *P. penelopus*) also distributed in the Magdalena river valley by having smooth and dark gray ventral surface, a bright yellow band on the forearm, and no calcar tubercle (in contrast with brown ventral surface with cream flecking, absence of yellow band and presence of calcar tubercle in *P. penelopus*).

Pristimantis jaguensis Rivera-Prieto, Rivera-Correa & Daza, 2014: Figure 3F

Pristimantis jaguensis Rivera-Prieto, Rivera-Correa & Daza 2014: 225.

Material examined. Table 1.

A moderated-sized frog characterized by a wide variation in color; absence of nuptial pads, discoidal fold and conical calcar tubercles; flanks and belly white to cream without blotches as well as iris yellow ocher to copper with thick brown reticulation and cream sclera (Rivera et al. 2014). This species co-occurs in the Magdalena river valley with *Pristimantis penelopus* and *P. viejas* and may be distinguished from both by having smooth skin and lacking a calcar tubercle (dorsum with tubercles including the heel in *P. penelopus* and *P. viejas*) and the concealed surfaces of the thighs yellow without blotches (orange spots on the concealed surfaces of the limbs in *P. viejas*; yellow spots on the concealed surfaces of the limbs, sometimes forming a reticle, in *P. penelopus*).

Pristimantis penelopus (Lynch & Rueda-Almonacid, 1999): Figure 3G

Eleutherodactylus penelopus Lynch and Rueda-Almonacid 1999: 310.
Pristimantis penelopus — Hedges et al. 2008: 128.

Material examined. Table 1.

A moderated-sized frog with a shagreen dorsum; tubercles posteriorly and on flanks; no dorsolateral folds; skin of venter brown with cream flecking; discoidal folds prominent; subanal tubercles only slightly larger than granules on underside of thighs; and iris copper with black reticulation. Males have spots on concealed surfaces of the thighs, a feature shared with *Pristimantis viejas;* nevertheless, these spots are usually yellow (sometimes forming a reticle) in *P. penelopus* and orange in *P. viejas. Pristimantis penelopus* is also similar to *P. latidiscus* from which it may distinguished in having a brown venter with cream flecking (in contrast to a cream venter with brown reticulation) (Lynch and Rueda-Almonacid 1999, Restrepo et al. 2017).

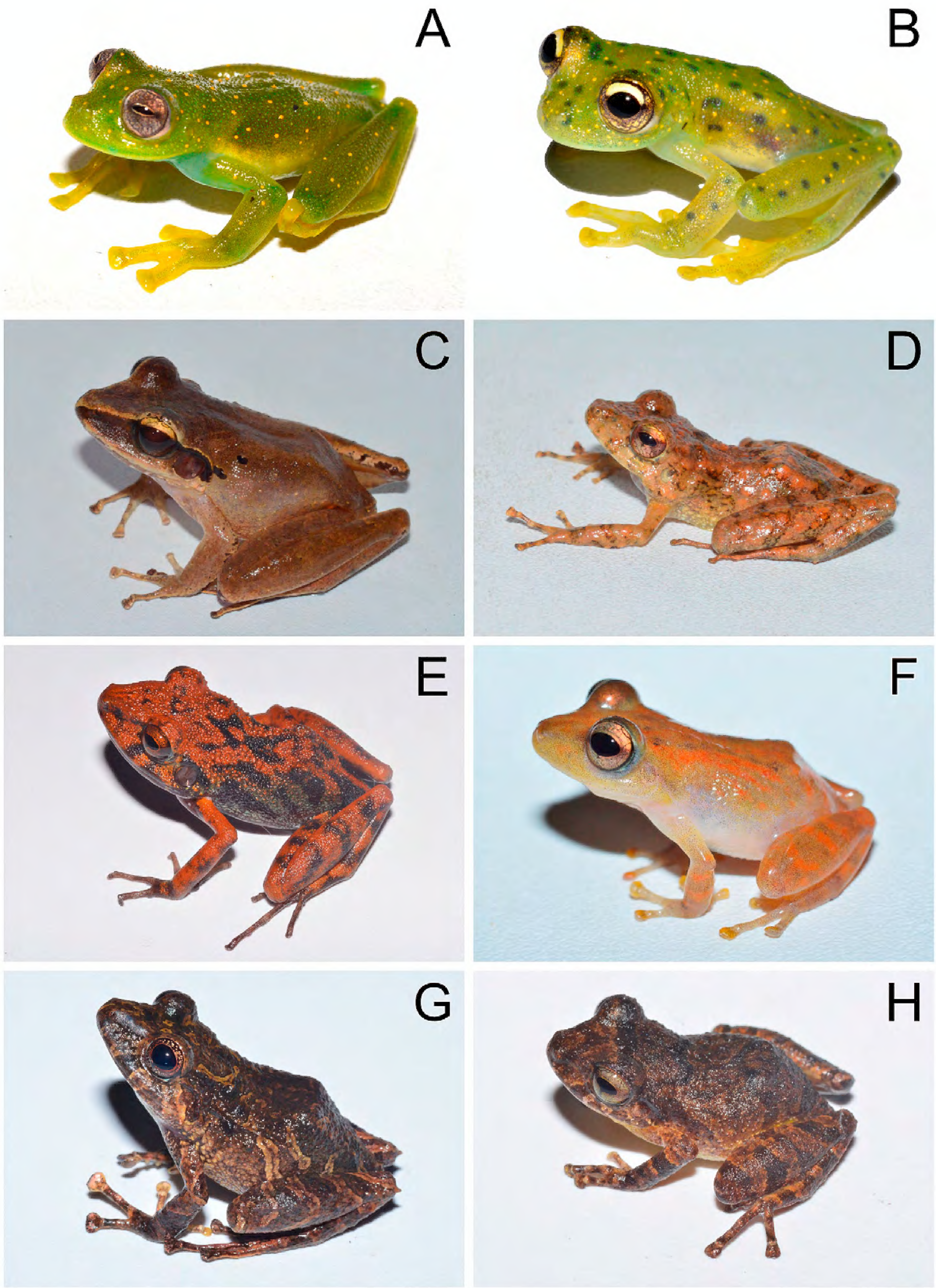

Figure 3. Amphibian species present in Jaguas and San Carlos hydroelectric protected areas. **A:** *Sachatamia punctulata* MHUAA 10689. **B:** *Sachatamia* sp. MHUAA 8205. **C:** *Craugastor metriosistus* MHUAA 10589. **D:** *Pristimantis fallax* MHUAA 10523. **E:** *Pristimantis gaigei* MHUAA 8497. **F:** *Pristimantis jaguensis*. **G:** *Pristimantis penelopus* MHUAA 8487. **H:** *Pristimantis taeniatus* MHUAA 8483.

Pristimantis taeniatus (Boulenger, 1912): Figure 3H
Eleutherodactylus taeniatus Boulenger 1912: 188.
Pristimantis taeniatus — Hedges et al. 2008: 121.

Material examined. Table 1.

Pristimantis viejas (Lynch & Rueda-Almonacid, 1999): Figure 4A
Eleutherodactylus viejas Lynch and Rueda-Almonacid 1999: 311.
Pristimantis viejas — Hedges et al. 2008: 121.

Material examined. Table 1.

A small-sized frog with numerous non-conical tubercles on dorsum; absence of dorsolateral folds; finger I shorter than finger II; toe V very long; brown above with darker brown markings; venter cream stippled with brown and posterior surfaces of the thighs brown with large cream spots. Superficially similar to *Pristimantis taeniatus* in lacking a canthal stripe, but readily distinguished from that species in having orange spots on the concealed surfaces of the limbs (absent in *P. taeniatus*; Lynch and Rueda-Almonacid 1999).

Colostethus inguinalis (Cope, 1868): Figure 4B
Prostherapis inguinalis Cope 1868: 10.
Colostethus inguinalis — Savage 1968: 745.

Material examined. Table 1.

A moderate-sized dendrobatid with a pale oblique lateral stripe extending from groin only to around midbody; pale ventrolateral stripes present; pale dorsolateral stripes absent and toes moderately webbed. *Colostethus inguinalis* may be distinguished from *C.* aff. *fraterdanieli* (also distributed in the Magdalena river valley) by having an incomplete pale oblique lateral stripe (complete in *C.* aff. *fraterdanieli*) and by the throat coloration of adults (black in adult males, white unpigmented or faintly pigmented gray or brown in adult females in *C. inguinalis;* spotted in adult males and immaculate in adult females *in C.* aff. *fraterdanieli*). It differs from *C. pratti* both in toe webbing (absent in *C. pratti*) and adult male throat coloration (pale gray or brown with irregular white spots, forming a faint, mottled or reticulated pattern in *C. pratti*).

Colostethus* aff. *fraterdanieli: Figure 4C

Material examined. Table 1.

A moderate-sized dendrobatid with dorsal skin texture granular posteriorly; pale dorsolateral stripe absent; pale oblique lateral stripe complete (extending from groin to eye); pale ventrolateral stripe present; coloration pattern of throat spotted in males, immaculate in females (Tolosa et al. 2014). *Colostethus* aff. *fraterdanieli* differs from *C. fraterdanieli* in having a pale ventrolateral stripe (absent in *C. fraterdanieli*) and a continuous dark band running along the lateral surfaces of body and head (discontinuous in *C. fraterdanieli*). It may be distinguished from *C. inguinalis* by having a complete oblique lateral stripe (partial in *C. inguinalis*) and from *C. pratti* by lacking pale dorsolateral stripe (present in *C. pratti*).

Dendrobates truncatus (Cope, 1861): Figure 4D
Phyllobates truncatus Cope 1861a: 372.
Dendrobates truncatus — Cope 1867: 197.

Material examined. Table 1.

Diasporus anthrax (Lynch, 2001): Figure 4E
Eleutherodactylus anthrax Lynch 2001: 292.
Diasporus anthrax — Hedges et al. 2008: 47.

Material examined. Table 1.

Small frog with skin of dorsum smooth; tympanum round and prominent; snout subacuminate in dorsal view, rounded in lateral view; all fingers and toes with expanded disks; pads triangular on toes III–IV; dorsum brown with darker blotches and venter dark brown with whitish flecks. *Diasporus anthrax* differs from other species of the genus by its coloration which consist in a dark venter with white flecks and pale blotches (red in life) on the concealed surfaces of the limb (orange above, venter immaculate, and lacking distinctive coloration marks on limbs in *D. gularis*; brown above, venter white with brown marbling, and lacking distinctive coloration marks on limbs in *D. tinker*) and the rounded disk pads and disk covers except for finger III and toes III–IV in contrast with all fingers bearing narrow disks and disk cover of finger III bearing elongate papilla in *D. tinker;* unornamented disk covers and knobbed disk cover occur in about equal frequency in *D. gularis* (Lynch 2001).

Diasporus gularis (Boulenger, 1898): Figure 4F
Hylodes gularis Boulenger 1898: 121.
Diasporus gularis — Hedges et al. 2008: 47.

Material examined. Table 1.

A small frog with short body; snout nearly truncate at tip when viewed from above, truncate in profile; nostrils strongly projecting laterally; fingers very short, with lateral ridges, pointed disks, and very small basal webbings; skin of upper surfaces smooth with a few short weak glandular lines above shoulders and along sides. The best diagnostic characters to recognize *Diasporus gularis* are its very short hands and feet with pointed fingers and toes, of which the entire terminal disk is dark gray, and the enormous U-shaped gular pouch of the males (Cochran and Goin 1970). *Diasporus gularis* is most readily distinguished from other *Diasporus* (i.e., *D. anthrax* and *D. tinker*) by its coloration which is orange above with a transverse dark bar between eyes and immaculate venter (dorsum brown with darker blotches and venter dark brown with whitish flecks in *D. anthrax*; brown above with a tan interorbital bar, dorsolateral flank stripes and venter white with brown marbling in *D. tinker*; Lynch 2001).

Hemiphractus fasciatus Peters, 1862: Figure 4G
Hemiphractus fasciatus Peters 1862: 169.

Boana boans (Linnaeus, 1758): Figure 4H
Rana boans Linnaeus 1758: 213.
Hypsiboas boans — Faivovich et al. 2005: 89.
Boana boans — Dubois 2017: 28.

Material examined. Table 1.

Boana xerophylla (Duméril & Bibron, 1841): Figure 5A
Hyla xerophylla Duméril and Bibron 1841: 549.
Hypsiboas xerophyllus — Orrico et al. 2017: 107.
Boana xerophylla — Dubois 2017: 28.

Material examined. Table 1.

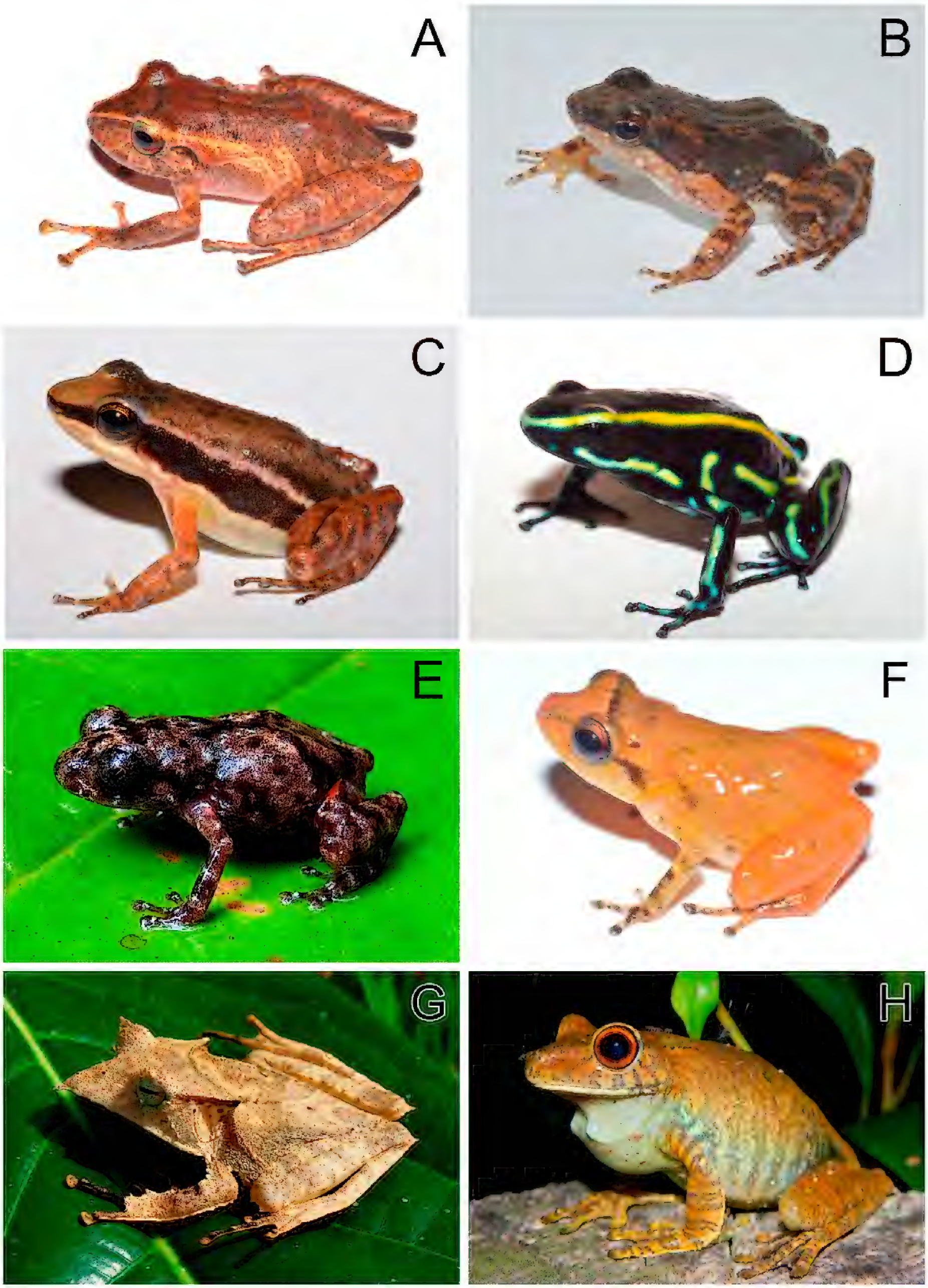

Figure 4. Amphibian species present in Jaguas and San Carlos hydroelectric protected areas. **A:** *Pristimantis viejas* MHUAA 9742. **B:** *Colostethus inguinalis* MHUAA. 10645. **C:** *Colostethus* aff. *fraterdanieli* MHUAA 8140. **D:** *Dendrobates truncatus* MHUAA 9740. **E:** *Diasporus anthrax* MHUAA 7237. **F:** *Diasporus gularis* MHUAA 8496. **G:** *Hemiphractus fasciatus*. **H:** *Boana boans* MHUAA 10564.

This species was recently separated from *Boana crepitans* (Orrico et al. 2017). A large-sized tree frog having its dorsal surfaces pinkish tan with some darker brown spots, blotches or other markings; dark bars on the upper surfaces of the thighs extending onto the rear surfaces of the thighs; ventral surface orange, except for the throat and chest, which are white with some brown flecking. *Boana xerophylla* may be confused with *B. boans* and *B. pugnax* (species distributed in the Magdalena river valley) due to similarities in body size and coloration. However, it may be distinguished by its horizontal pupil and its iris that is pale gray at the center and greenish yellow at the edges (in contrast to a rhomboid pupil with an iris that is black at the center and light orange at the edges in *B. boans,* and a horizontal pupil with an iris that is black at the center and greenish in the upper portion in *B. pugnax*).

Dendropsophus ebraccatus (Cope, 1874): Figure 5B
Hyla ebraccata Cope 1874: 69.
Dendropsophus ebraccatus — Faivovich et al. 2005: 91.

Material examined. Table 1.

Dendropsophus microcephalus (Cope, 1886): Figure 5C
Hyla microcephala Cope 1886: 281.
Dendropsophus microcephalus — Faivovich et al. 2005: 92.

Dendropsophus norandinus Rivera-Correa & Guitérrez-Cárdenas, 2012: Figure 5D
Dendropsophus norandinus Rivera-Correa & Guitérrez-Cárdenas 2012: 51.

Material examined. Table 1.

A small hylid frog with a snout that is short, rounded in dorsal view and slightly rounded in lateral view; head wider than long; skin on dorsal surfaces smooth, with some minute scattered tubercles; axillary membrane present and developed; dorsum reddish brown in females and cream or silver gray in males (Rivera-Correa and Guitérrez-Cárdenas 2012). *Dendropsophus norandinus* may be distinguished from *D. bogerti* by having the head wider than long (longer than wide in *D. bogerti*) and by having finger webbing that extends to the base of the disks of toes I, II, and III (finger webbing absent in *D. bogerti*), from *D. subocularis* by lacking light bands connecting eye to edge of lips, and from *D. microcephalus* by its webbed fingers (fingers free in *D. microcephalus*).

Dendropsophus subocularis (Dunn, 1934): Figure 5E
Hyla subocularis Dunn 1934: 2.
Dendropsophus subocularis — Faivovich et al. 2005: 93.

Material examined. Table 1.

A small hylid frog with short snout; canthus rostralis very marked; fingers webbed at base about toes I–III; toes webbed nearly to disks of III and V; skin of dorsum smooth and skin of vent rugose (Dunn 1934). *Dendropsophus subocularis* co-occurs with *D. microcephalus* and *D. norandinus* in the Magdalena river valley. It may be distinguished from both by the presence of 2 light bands from the eye to the edge of the lips, enclosing a bar of dark between them (absent in the latter 2 species), and from *D. microcephalus* by its webbed fingers (fingers free in *D. microcephalus*).

Hyloscirtus palmeri (Boulenger, 1908): Figure 5F
Hyla palmeri Boulenger 1908: 515.
Hyloscirtus palmeri — Faivovich et al. 2005: 85.

Material examined. Table 1.

Phyllomedusa venusta Duellman & Trueb, 1967: Figure 5G
Phyllomedusa venusta Duellman and Trueb 1967: 128.

Material examined. Table 1.

***Scinax* sp.**: Figure 5H

Material examined. Table 1.

Our *Scinax* sp. corresponds to *Scinax* "A", an undescribed species proposed by Nieto-Castro (1999) using morphological traits, morphometric and chromatic analyses. From that study, the name began to be used to refer to populations of *Scinax* distributed in Antioquia and Cundinamarca, characterized by having a golden color with a dorsal spotted pattern.

Scinax rostratus (Peters, 1863): Figure 6A
Hyla rostrata Peters 1863a: 466.
Scinax rostratus — Köhler and Böhme 1996: 139.

Material examined. Table 1.

A moderate-sized hylid frog characterized by a conspicuous acuminate and projecting snout in dorsal view, protruding in lateral view (Duellman 1970). *Scinax rostratus* is readily distinguished from *Scinax ruber* and *Smilisca sila* (both species occurring in the Magdalena river valley) by the combination of its characteristic snout and coloration pattern (surfaces of thighs yellow or pale orange with black or dark brown markings in *S. rostratus*; distinct black and white markings on posterior thighs in *S. ruber*; blue spots on flanks and posterior surfaces of the thighs in *S. sila*).

Scinax ruber (Laurenti, 1768): Figure 6B
Hyla rubra Laurenti 1768: 35.
Scinax ruber — Kölher and Böhme 1996: 139.

Material examined. Table 1.

A medium-sized frog with toes webbed except for the innermost; dorsal surfaces generally olive brown or orange-brown; distinct black and white markings on posterior surfaces of thighs. Related species which may be confused with *Scinax ruber* are *S. boulengeri* and *S. rostratus* (also distributed in the Magdalena river valley) from both of these it differs by its smaller size and the presence of black markings on the thighs in form of vermiculations instead of broad and vertical dark bands (Cochran and Goin 1970). *Scinax ruber* is also similar to *Smilisca phaeota* from which it differs by lacking green coloration in the rostral region, and to *Smilisca sila* from which it differs by the absence of blue spots on the flanks and posterior surfaces of the thighs.

Smilisca phaeota (Cope, 1862): Figure 6C
Hyla phaeota Cope 1862: 358.
Smilisca phaeota — Starrett 1960: 303.

Material examined. Table 1.

Engystomops pustulosus (Cope, 1864): Figure 6D
Paludicola pustulosa Cope 1864: 180.
Engystomops pustulosus — Boulenger 1882: 276.

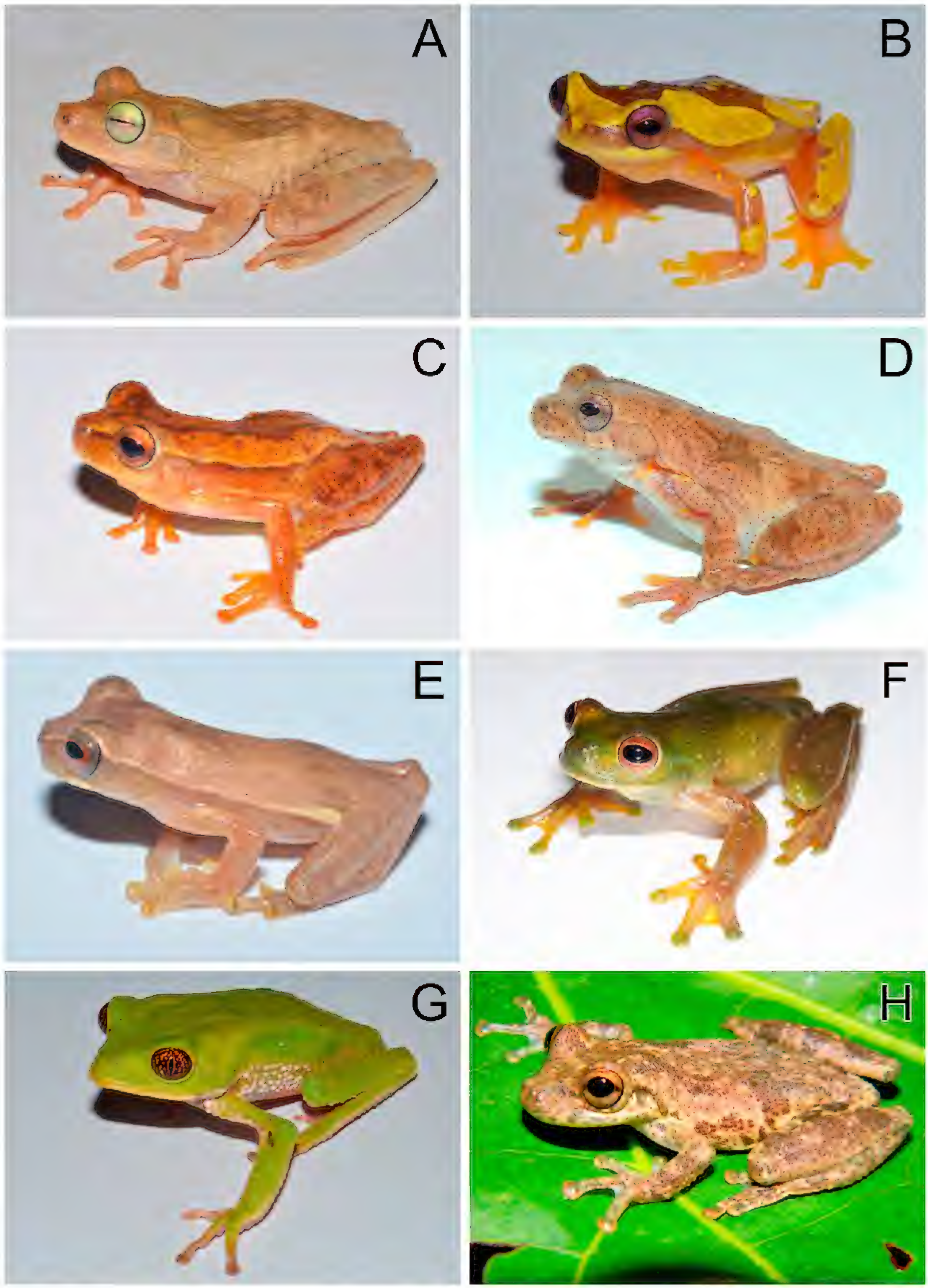

Figure 5. Amphibian species present in Jaguas and San Carlos hydroelectric protected areas. **A:** *Boana xerophyllus* MHUAA 10567. **B:** *Dendropsophus ebraccatus* MHUAA 10692. **C:** *Dendropsophus microcephalus* MHUAA 8667. **D:** *Dendropsophus norandinus* MHUAA 8589. **E:** *Dendropsophus subocularis* MHUAA 8490. **F:** *Hyloscirtus palmeri* MHUAA 9504. **G:** *Phyllomedusa venusta* MHUAA 10581. **H:** *Scinax* sp. MHUAA 8228.

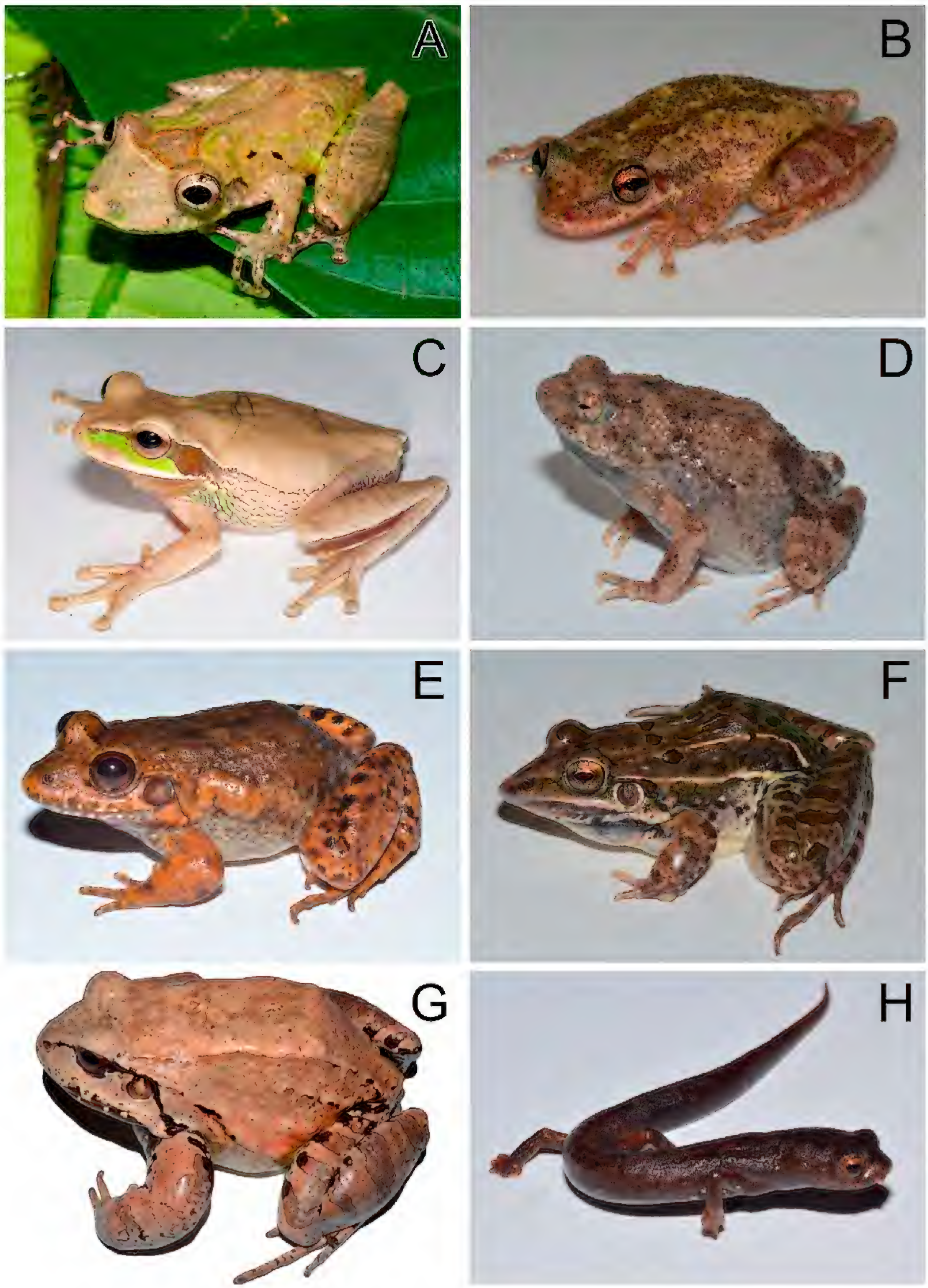

Figure 6. Amphibian species present in Jaguas and San Carlos hydroelectric protected areas. **A:** *Scinax rostratus* MHUAA 7233. **B:** *Scinax ruber* MHUAA 9500. **C:** *Smilisca phaeota* MHUAA 9503. **D:** *Engystomops pustulosus* MHUAA 10602. **E:** *Leptodactylus colombiensis* MHUAA 8818. **F:** *Leptodactylus fuscus* MHUAA 10598. **G:** *Leptodactylus savagei* MHUAA 9768. **H:** *Bolitoglossa ramosi.*

Figure 7. Amphibian species present in Jaguas and San Carlos hydroelectric protected areas. **A:** *Caecilia thompsoni* MHUAA 7192. **B:** *Microcaecilia pricei* MHUA-A 10728. **C:** *Epicrionops parkeri* MHUA-A 10720.

Physalaemus pustulosus — Lynch 1970: 488.

Material examined. Table 1.

Leptodactylus colombiensis Heyer, 1994: Figure 6E

Leptodactylus colombiensis Heyer 1994: 82.

Material examined. Table 1.

Leptodactylus fuscus (Schneider, 1799): Figure 6F

Rana fusca Schneider 1799: 130.

Leptodactylus fuscus — Heyer 1968: 160.

Material examined. Table 1.

Leptodactylus savagei Heyer, 2005: Figure 6G

Leptodactylus savagei Heyer 2005: 330.

Bolitoglossa ramosi Brame & Wake, 1972: Figure 6H

Bolitoglossa ramosi Brame and Wake 1972: 9.

Material examined. Table 1.

Caecilia thompsoni Boulenger, 1902: Figure 7A

Caecilia thompsoni Boulenger 1902: 152.

Material examined. Table 1.

A large caecilian with generally cylindrical body; eye in an open orbit and tentacular aperture below nostril, close to the anterior portion of the face (Lynch 1999). *Caecilia thompsoni* is readily distinguished from *C. subnigricans* (another species known from Magdalena river valley) by having a longer body (up to 1.5 m in *C. thompsoni*; 0.35–0.37 m in *C. subnigricans*) and more primary (187–240 in *C. thompsoni*; 145–169 in *C. subnigricans*) and secondary annuli (26–30 in *C. thompsoni*; 6–27 in *C. subnigricans*)

Microcaecilia pricei (Dunn, 1944): Figure 7B

Gymnopis pricei Dunn 1944: 473.

Microcaecilia pricei — Wilkinson, O'Connor and Nassbaum 2013: 7.

Material examined. Table 1.

Epicrionops parkeri (Dunn, 1942): Figure 7C

Rhinatrema parkeri Dunn 1942: 458.

Epicrionops parkeri — Taylor 1968: 216.

Material examined. Table 1.

A bicolored caecilian with well-developed tail; lateral stripe yellow, cream or white from head or second collar onto tail; stripe ending at posterior level of vent; subcaudal region dark lilac to blackish (Taylor 1968). *Epicrionops parkeri* differs from *E. bicolor* (a species with similar coloration pattern distributed in Colombia) by having a larger body length and 198 primary annuli (in contrast to 117–135 primary annuli in *E. bicolor*).

Reptiles

We report 58 reptile species comprising 47 genera in 16 families (Table 2). The protected area of Jaguas hydroelectric project has 38 species from 14 families, where the most speciose families were Dipsadidae and Colubridae with 10 and 8 species, respectively (26 and 21%). One species (*Anolis sulcifrons* Daudin, 1802) is endemic to Colombia and only 10 (26%) have been evaluated by the IUCN, 1 listed as Near Threatened and 9 as Least Concern (Table 4). In contrast, in San Carlos we found 57 reptile species comprising 16 families. Again, the most speciose families at this site were Dipsadidae with 15 species (26%) and Colubridae with 11 species (19%). Two species, *Anolis sulcifrons* Daudin, 1802 and *Ninia teresitae* Angarita-Sierra & Lynch, 2017 are endemic to

Colombia (4%) and 16 have been evaluated by the IUCN (2016), all of them categorized as Least Concern. Jaguas and San Carlos localities shared 36 reptile species.

Basiliscus galeritus Duméril, 1851: Figure 8A
Basiliscus galeritus Duméril 1851: 61.

Material examined. Table 2.

Adults of this large semiaquatic lizard are easily recognized by their gray to green color and the presence of a single, rounded head crest that is larger in males. Similar species that are found sympatric with *B. galeritus* are *Corytophanes cristatus* and *Basiliscus basiliscus.* The first is usually brownish and has 2 head crests that converge posteriorly. *Basiliscus basiliscus* has a brown or gray coloration and a single pointed head crest that is larger in males. Males of *B. basiliscus* also have a large crest in the back that resembles a fin (Maturana 1962; Savage 2002; Köhler 2008).

Corytophanes cristatus (Merrem, 1820): Figure 8B
Agama cristata Merrem 1820: 50.
Corytophanes cristatus —Boie *in* Schlegel 1827: 290.

Material examined. Table 2.

Anolis auratus Daudin, 1802: Figure 8C
Anolis auratus Daudin 1802: 89.

Material examined. Table 2.

Anolis fuscoauratus D'Orbigny, 1837
Anolis fuscoauratus D'Orbigny *in* Duméril and Bibron 1837: 110.

Material examined. Table 2.

Anolis* aff. *granuliceps: Figure 8D

Material examined. Table 2.

Anolis sulcifrons Cope, 1899: Figure 8E
Anolis sulcifrons Cope 1899: 6.

Material examined. Table 2.

Anolis tropidogaster Hallowell, 1956: Figure 8F
Anolis tropidogaster Hallowell 1956: 224.

Anolis vittigerus Cope, 1862
Anolis vittigerus Cope 1862: 179.

Material examined. Table 2.

Anadia* gr. *ocellata Gray, 1845: Figure 8G

Material examined. Table 2.

This small lizard may be distinguished from most other mid- to low-elevation gymnophthalmid lizards in having an acuminate snouth and elongate body in combination with smooth head and dorsal scales. Its color pattern includes a series of lateral white spots between the fore and hind limbs (Oftedal 1974, Savage 2002). Usually, anterior most spots are bordered by black, forming ocelli. Although there is no evidence of *Anadia ocellata* for the Magdalena river valley, we assigned the specimen MHUAR 12694 to *Anadia* gr. *ocellata* because its dorsal coloration and 55 transversal rows in contrast to the 44–48 dorsal rows found in *A. rhombifera*, another species present in the Magdalena river valley (Oftedal 1974, Savage 2002).

***Cercosaura* sp.**: Figure 8H

Material examined. Table 2.

Echinosaura palmeri Boulenger, 1911: Figure 9A
Echinosaura palmeri Boulenger 1911: 23.

Material examined. Table 2.

Loxopholis rugiceps Cope, 1869
Loxopholis rugiceps Cope 1869: 305.

Material examined. Table 2.

Loxopholis southi (Ruthven & Gaige, 1924): Figure 9B
Leposoma southi Ruthven and Gaige 1924: 1.
Loxopholis southi — Goicoechea et al. 2016: 32.

Material examined. Table 2.

This species is easily differentiated from other gymnophthalmid lizards in the region by its strongly keeled head and dorsal scales and by having the ventral scales large, keeled, mucronate, and quadrangular to rectangular. It differs from *Loxopholis rugiceps,* the only other *Loxopholis* in trans-Andean Colombia, by having the frontonasal divided, instead of single (Köhler 2008).

***Ptychoglossus* sp.**: Figure 9C

Material examined. Table 2.

Thecadactylus rapicauda (Houttuyn, 1782): Figure 9D
Gekko rapicauda Houttuyn 1782: 323.
Thecadactylus rapicauda — Boulenger 1885: 111.

Material examined. Table 2.

Polychrus gutturosus Berthold, 1846: Figure 9E
Polychrus gutturosus Berthold 1846: 11.

This large blunt-headed lizard is immediately recognizable by its extremely long round tail that is at least twice the snouth–vent length, its robust body and relatively thin legs, and the presence of a large subtympanic scale (Peters and Donoso-Barros 1970, Savage 2002). In addition, it lacks toe pads, nuchal, dorsal and caudal crests (Peters and Donoso-Barros 1970, Savage 2002). It differs from *Polychrus marmoratus*, the other species that could be sympatric, because the latter has a row of

Table 2. Voucher list of reptiles of Jaguas and San Carlos hydroelectric compensation areas with geographic coordinates.

Taxon	Voucher	Latitude	Longitude
REPTILIA			
SQUAMATA			
SAURIA			
Corytophanidae			
Basiliscus galeritus	MHUA-R 13010	6.277	-74.93104
	MHUA-R 13009	6.2832	-74.92413
	MHUA-R 13016	6.29256	-75.04247
	MHUA-R 13006	6.29922	-74.96633
	MHUA-R 13173	6.3515	-74.99528
Corytophanes cristatus	MHUA-R 12468	6.21854	-74.83727
	MHUA-R 12429	6.24537	-74.86961
	MHUA-R 13015	6.28288	-74.92422
	MHUA-R 13191	6.19012	-74.80477

Continued

Table 2. *Continued.*

Taxon	Voucher	Latitude	Longitude
Dactyloidae			
Anolis auratus	MHUA-R 12432	6.2199	-74.84463
	MHUA-R 13216	6.20643	-74.83891
	MHUA-R 13217	6.20643	-74.83891
	MHUA-R 13218	6.20643	-74.83891
Anolis fuscoauratus	MHUA-R 12433	6.21537	-74.83533
Anolis aff. *granuliceps*	MHUA-R 12726	6.19062	-74.80474
	MHUA-R 12792	6.19086	-74.80454
	MHUA-R 12514	6.1957	-74.8167
	MHUA-R 12482	6.21768	-74.83748
	MHUA-R 13013	6.32754	-75.01631
	MHUA-R 13011	6.32781	-75.01151
	MHUA-R 13014	6.32791	-75.01171
	MHUA-R 12725	6.36725	-75.02723
	MHUA-R 12513	6.3693	-75.0252
	MHUA-R 12445	6.37236	-75.04374
	MHUA-R 12745	6.38528	-75.02158
	MHUA-R 12695	6.38871	-75.02335
	MHUA-R 12746	6.39128	-75.0364
	MHUA-R 12438	6.39677	-75.01162
	MHUA-R 12436	6.40714	-75.02618
	MHUA-R 12442	6.21611	-75.00078
	MHUA-R 12441	6.37088	-75.04567
	MHUA-R 12440	6.37187	-75.04636
	MHUA-R 12435	6.37588	-75.03902
	MHUA-R 12019	6.8906	-75.5067
	MHUA-R 12393	7.393528	-75.036633
	MHUA-R 13211	6.39912	-75.02728
	MHUA-R 13226	6.1401	-75.06688
	MHUA-R 13227	6.14229	-75.06267
Anolis sulcifrons	MHUA-R 12696	6.19055	-74.8048
	MHUA-R 12431	6.20801	-74.8157
	MHUA-R 12434	6.21146	-74.82359
	MHUA-R 12464	6.21872	-74.84776
	MHUA-R 12443	6.24739	-74.86933
Anolis vittigerus	MHUA-R 12512	6.1957	-74.8167
Gymnophthalmidae			
Anadia gr. ocellata	MHUA-R 12694	6.1957	-74.8167
Cercosaura sp.	MHUA-R 12762	6.409987	-75.14157
	MHUA-R 13221	6.287778	-74.828611
Echinosaura palmeri	MHUA-R 13212	6.3995	-75.02823
	MHUA-R 13213	6.3994	-74.0284
	MHUA-R 13223	6.15816	-75.04485
	MHUA-R 13224	6.15813	-75.04476
	MHUA-R 13225	6.1584	-75.04494
Loxopholis rucigeps	MHUA-R 12107	6.2247	-74.8477
Loxopholis southi	MHUA-R 12430	6.20671	-74.855
	MHUA-R 12465	6.21841	-74.84771
	MHUA-R 12105	6.2275	-74.8525
	MHUA-R 12466	6.22787	-74.872264
	MHUA-R 12106	6.2275	-74.8525
Ptychoglossus sp.	MHUA-R 12602	6.36665	-75.02802
Phyllodactylidae			
Thecadactylus rapicauda	MHUA-R 12601	6.19132	-74.80448
Sphaerodactylidae			
Gonatodes albogularis	MHUA-R 12423	6.231083	-74.876611
Lepidoblepharis xanthostigma	MHUA-R 12467	6.2072	-74.81239
	MHUA-R 12471	6.2167	-74.86468
	MHUA-R 12422	6.231083	-74.876611
	MHUA-R 13012	6.29719	-74.91953
	MHUA-R 13008	6.29826	-74.91976
	MHUA-R 12698	6.39202	-75.0365
Sphaerodactylus lineolatus	MHUA-R 12470	6.18822	-74.8045
	MHUA-R 12728	6.19062	-74.80474
	MHUA-R 12469	6.21856	-74.83739
Teiidae			
Holcosus festivus	MHUA-R 12444	6.21537	-74.83533
	MHUA-R 12018	6.8906	-75.5067

Taxon	Voucher	Latitude	Longitude
	MHUA-R 13174	6.36704	-75.02715
Amphisbaenidae			
Amphisbaena varia	MHUA-R 12276	6.19073	-74.80437
Colubridae			
Chironius grandisquamis	MHUA-R 15011	6.36728	-75.02697
Dendrophidion percarinatum	MHUA-R 14764	6.19073	-74.80437
Drymobius rhombifer	MHUA-R 15012	6.39058	-75.03704
Mastigodryas boddaerti	MHUA-R 15054	6.19062	-74.80474
	MHUA-R 15078	6.28296	-74.92384
	MHUA-R 14866	6.22879	-74.87466
Phrynonax poecilonotus	MHUA-R 15013	6.19675	-74.80444
Scaphiodontophis venustissimus	MHUA-R 14871	6.2189	-74.8477
Tantilla melanocephala	MHUA-R 14855	6.21854	-74.83727
	MHUA-R 14842	6.22148	-74.8418
Dipsadidae			
Atractus occipitoalbus	MHUA-R 15131	6.36767	-75.02635
Coniophanes fissidens	MHUA-R 14865	6.21691	-74.81272
	MHUA-R 14879	6.2189	-74.8477
	MHUA-R 14846	6.3852	-74.99314
	MHUA-R 15133	6.20908	-74.85436
Erythrolamprus epinephelus	MHUA-R 14841	6.20874	-74.81525
Erythrolamprus pseudocorallus	MHUA-R 14826	6.349358	-75.002699
	MHUA-R 14856	6.20716	-74.81999
Imantodes cenchoa	MHUA-R 14978	6.36725	-75.02723
	MHUA-R 15134	6.36704	-75.02715
Leptodeira septentrionalis	MHUA-R 15077	6.32938	-75.01601
	MHUA-R 14597	6.348145	-75.005172
Ninia atrata	MHUA-R 14847	6.2199	-74.84463
	MHUA-A 15130	6.23974	-74.8688
Ninia teresitae	MHUA-R 14860	6.21626	-74.83435
Oxyrhopus petolarius	MHUA-R 14843	6.21146	-74.82359
	MHUA-R 14693	6.8906	-75.5067
	MHUA-R 15150	6.38927	-74.99146
	MHUA-R 15151	6.25277	-74.82888
Rhadinaea decorata	MHUA-R 14859	6.2167	-74.86468
Sibon nebulatus	MHUA-R 14857	6.20716	-74.81999
	MHUA-R 15139	6.38747	-74.99274
	MHUA-R 15149	6.38927	-74.99151
	MHUA-R 15154	6.15764	-75.0416
Siphlophis compressus	MHUA-R 14733	6.1738	-74.7513
Urotheca fulviceps	MHUA-R 14979	6.19062	-74.80474
	MHUA-R 15055	6.19062	-74.80474
	MHUA-R 15132	6.37516	-74.98231
Elapidae			
Micrurus dumerilii	MHUA-R 15137	6.19032	-74.80515
	MHUA-R 15138	6.19032	-74.80515
Micrurus mipartitus	MHUA-R 14958	6.25141	-74.82854
	MHUA-R 15152	6.19228	-74.80225
Leptotyphlopidae			
Trilepida macrolepis	MHUA-R 14858	6.21734	-74.81262
Viperidae			
Bothrops asper	MHUA-R 14039	6.20453	-74.8949
	MHUA-R 14691	6.8906	-75.5067
Porthidium lansbergii	MHUA-R 14054	6.20453	-74.8949
	MHUA-R 14516	6.224778	-74.847778
	MHUA-R 15079	6.27689	-74.93108
	MHUA-R 14514	6.352361	-75.012139
	MHUA-R 14515	6.354778	-75.008278
	MHUA-R 14956	6.38553	-75.0218
	MHUA-R 14694	6.511907	-74.910799
	MHUA-R 14513	6.399989	-75.010364
TESTUDINES			
Kinosternidae			
Kinosternon leucostomum	MHUA-R 18526	6.38871	-75.02555
	MHUA-R 18310	6.1897	-74.9969

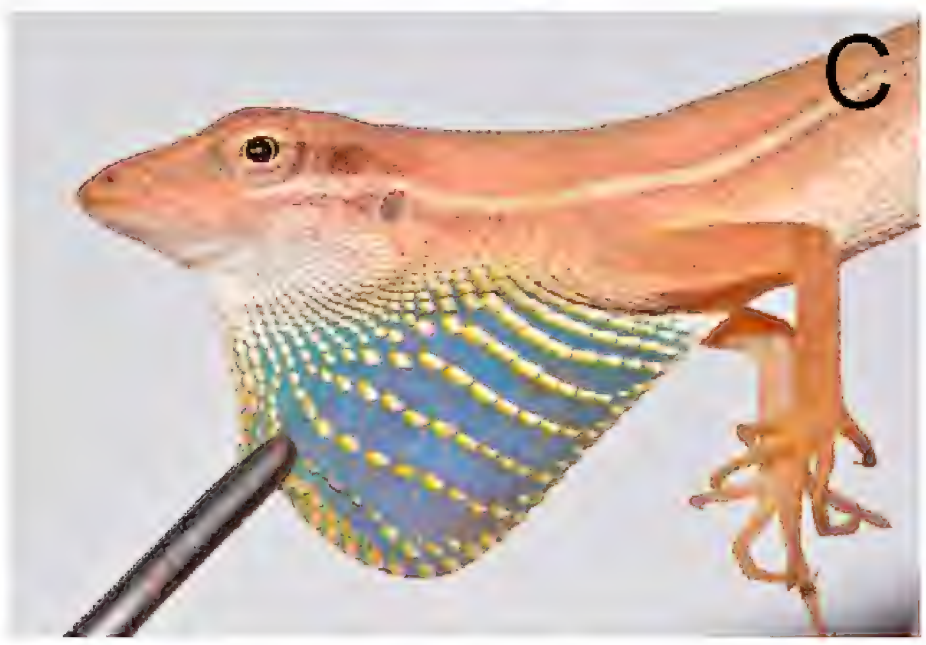

Figure 8. Reptile species present in Jaguas and San Carlos hydroelectric protected areas. **A:** *Basiliscus galeritus* MHUA-R 13009. **B:** *Corytophanes cristatus* MHUA-R 13015. **C:** *Anolis auratus* MHUA-R 13217. **D:** *Anolis* aff. *granuliceps* MHUA-R 13011. **E:** *Anolis sulcifrons* MHUA-R 12464. **F:** *Anolis tropidogaster*. **G:** *Anadia* gr. *ocellata* MHUA-R 12694. **H:** *Cercosaura* sp. MHUA-R 13162.

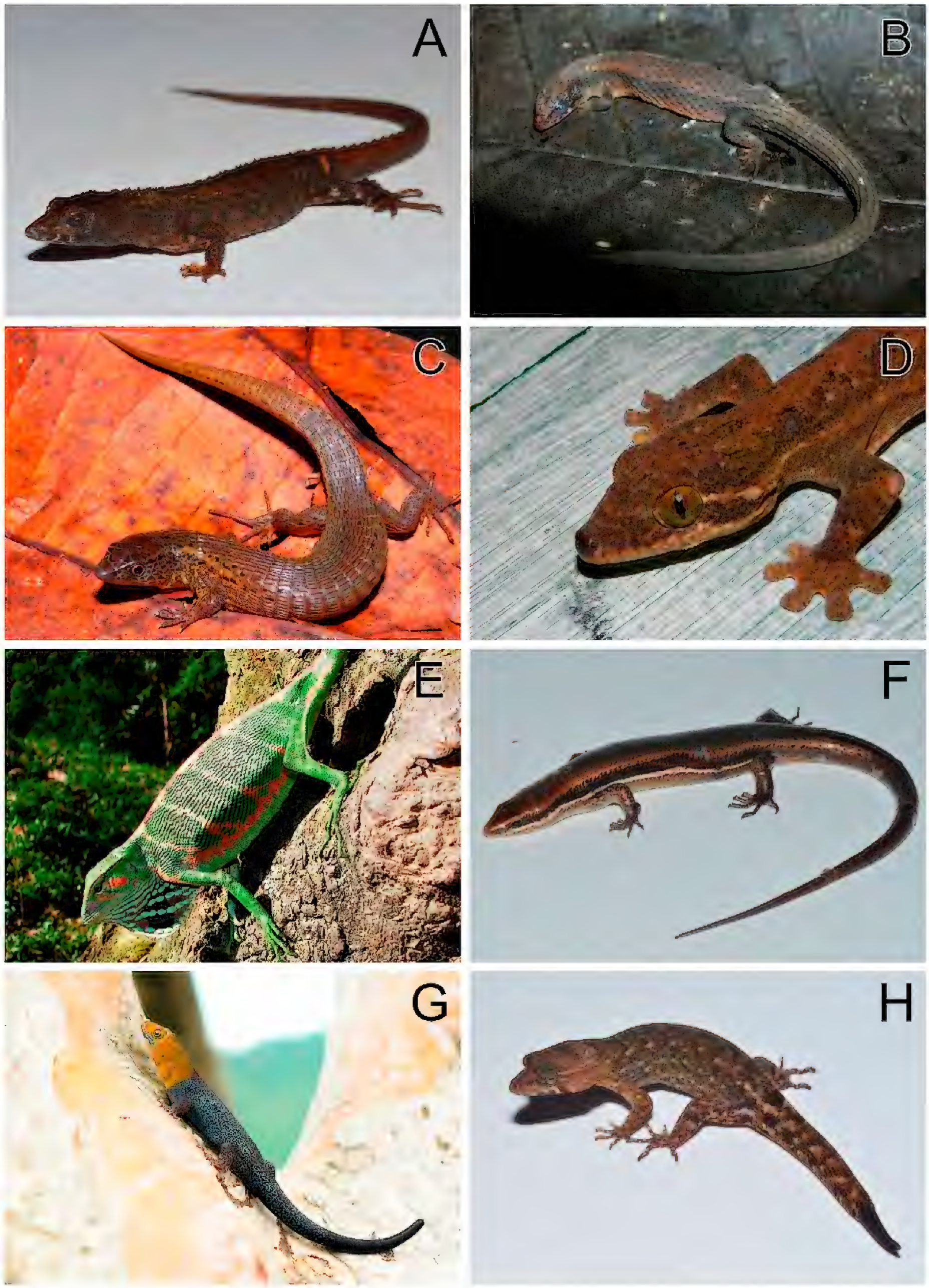

Figure 9. Reptile species present in Jaguas and San Carlos hydroelectric protected areas. **A:** *Echinosaura palmeri* MHUA-R 13158. **B:** *Loxopholis southi* MHUA-R 12466. **C:** *Ptychoglossus* sp. MHUA-R 12602. **D:** *Thecadactylus rapicauda* MHUA-R 12601. **E:** *Polychrus gutturosus.* **F:** *Marisora* sp. MHUA-R 13210. **G:** *Gonatodes albogularis* MHUA-R 12424. **H:** *Lepidoblepharis xanthostigma* MHUA-R 13012.

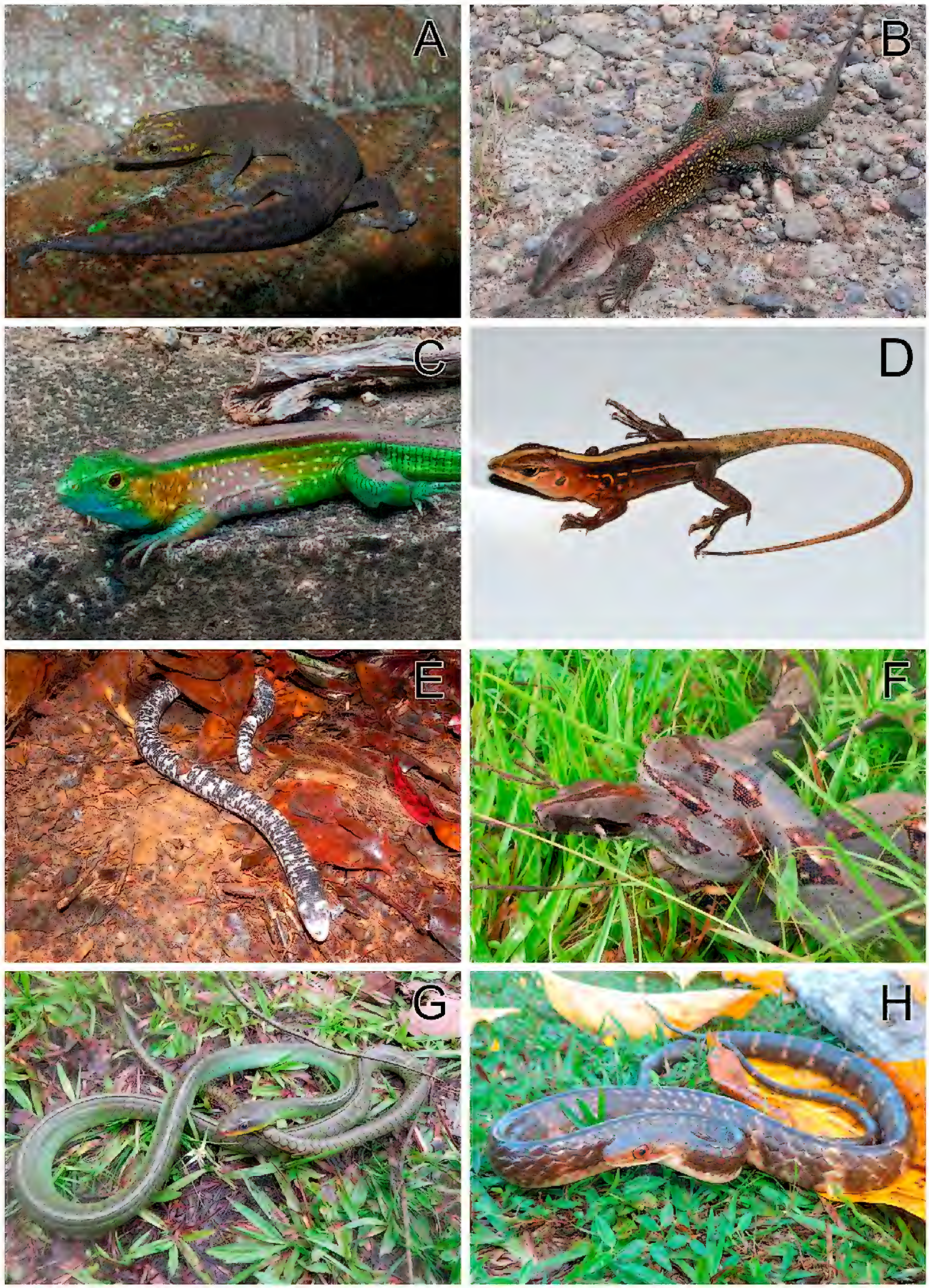

Figure 10. Reptile species present in Jaguas and San Carlos hydroelectric protected areas. **A:** *Sphaerodactylus lineolatus* MHUA-R 12470. **B:** *Ameiva* sp. **C:** *Cnemidophorus lemniscatus.* **D:** *Holcosus festivus* MHUA-R 13174. **E:** *Amphisbaena varia.* **F:** *Boa constrictor*. **G:** *Chironius exoletus*. **H:** *Chironius grandisquamis* MHUA-R 15011.

enlarged scales, forming a crest, in the mental and gular regions, which is absent in *P. gutturosus* (Peters and Donoso-Barros 1970).

Gonatodes albogularis (Duméril & Bibron, 1836): Figure 9G
Gymnodactylus albogularis Duméril and Bibron 1836: 415.
Gonatodes albogularis — Boulenger 1885: 59.

Material examined. Table 2.

Lepidoblepharis xanthostigma (Noble, 1916): Figure 9H
Lathrogecko xanthostigma Noble 1916: 87.
Lepidoblepharis xanthostigma — Vanzolini 1953: 264.

Material examined. Table 2.

This speices differs from other *Lepidoblepharis* species by having granular dorsals (cycloid in *L. sanctaemartae*), 12–14 lamellae under the fourth toe (<10 in *L. victormartinezi* and *L. emberawoundule*; Batista et al. 2015), median subcaudal scales more than twice as wide as the laterally adjacent subcaudals (less than 2 times in *L. rufigularis*; Batista et al. 2015).

Sphaerodactylus lineolatus Lichtenstein & von Martens 1856: Figure 10A
Sphaerodactylus lineolatus Lichtenstein & von Martens *in* Lichtenstein 1856: 6.

Material examined. Table 2.

Cnemidophorus lemniscatus (Linnaeus, 1758): Figure 10C
Lacerta lemniscata Linnaeus 1758: 209.
Cnemidophorus lemniscatus — Duméril and Bibron 1839: 129.

Holcosus festivus (Lichtenstein, 1856): Figure 10D
Cnemidophorus festivus Lichtenstein 1856: 13.
Holcosus festivus Harvey et al. 2012: 118.

Material examined. Table 2.

Amphisbaena varia Laurenti, 1768: Figure 10E
Amphisbaena varia Laurenti 1768: 66.

Material examined. Table 2.

This legless lizard is distinguished by its bullet-like head and rectangular body scales arranged in transversal rings (annuli). It has a whitish or pink ground with a large amount of irregular brown blotches, often obscuring ground color (Vanzolini 2002). *Amphisbaena varia* has traditionally been considered a subspecies of *A. fuliginosa* (Vanzolini 1951, 2002, Köhler 2008), but Gans (2005) elevated it to species level without further explanation.

Boa constrictor Linnaeus, 1758: Figure 10F
Boa constrictor Linnaeus 1758: 215.

Chironius exoletus (Linnaeus, 1758): Figure 10G
Coluber exoletus Linnaeus 1758: 223.
Chironius exoletus — Hoge, Romano and Cordeiro 1978: 41.

Chironius grandisquamis (Peters, 1869): Figure 10H
Spilotes grandisquamis Peters 1869: 451.
Chironius grandisquamis— Savage 2002: 650.

Material examined. Table 2.

This large species has a black or dark brown ground color and may have reddish or brown transversal bands (Dixon et al. 1993, Savage 2002). This species may be separated from its sympatric congeners by having 10 rows of dorsal scales with the paravertebral scales keeled (12 rows in *Chironius exoletus* and *C. carinatus*), by having its dorsum black, or brown with transversal bands (dorsally green in *C. exoletus* and yellowish or olive ground color with 2 broad reddish brown stripes in *C. carinatus*).

Dendrophidion percarinatum (Cope, 1893): Figure 11A
Drymobius percarinatum Cope 1893: 344.
Dendrophidion percarinatum — Smith 1941: 73

Material examined. Table 2

Drymobius rhombifer (Günther, 1860): Figure 11B
Coryphodon rhombifer Günther 1860: 236.
Drymobius rhombifer — Boulenger 1894: 14.

Material examined. Table 2.

Leptophis ahaetulla (Linnaeus, 1758): Figure 11C
Coluber ahaetulla Linnaeus 1758: 225.
Leptophis ahaetulla — Bell 1825: 328.

Mastigodryas boddaerti (Sentzen, 1796): Figure 11D
Coluber boddaerti Sentzen 1796: 59.
Mastigodryas boddaerti — Montingelli et al. 2011: 189.

Material examined. Table 2.

Oxybelis aeneus (Wagler, 1824): Figure 11E
Dryinus aeneus Wagler *in* Spix 1824: 12.
Oxybelis aeneus — Duméril and Bibron 1854: 819.

Phrynonax poecilonotus (Günther, 1858): Figure 11F
Spilotes poecilonotus Günther 1858: 100.
Phrynonax poecilonotus — Boulenger 1894: 20.

Material examined. Table 2.

Adults have either red or yellow ground color, with a variable dorsal pattern that may consist of black transversal bands or several black dots, mainly located in the posterior region of the scales. Other than coloration, the species differs from other sympatric snakes by having 21–25 dorsal rows at midbody, with the uppermost (3–19) rows keeled (Savage 2002). Some authors recognize an additional species in trans-Andean Colombia, *Phrynonax shropshirei* (Taylor 1954, Peters et al. 1970, Pérez-Santos and Moreno 1988), but according to Savage (2002), it seems to be a confusion given the wide color variation in *P. poecilonotus*. Likewise, the profound genetic distinction between *P. poecilonotus* and *P. polylepis* (Peters, 1876) revealed by Jadin et al. (2014), who accordingly resurrected the latter species, does apparently not correspond to any morphological distinction. Since neither Jadin et al. (2014) nor the original description (Peters 1876) offer any morphological characters to discriminate between these 2 species, we must assume such distinctions to be obscured by the exuberant variability in *Phrynonax* for now. Unable to answer the interesting question to which species our specimen actually pertains, at this point we choose a conservative approach and tentatively assign it to *P. poecilonotus*.

Scaphiodontophis venustissimus (Günther, 1893): Figure 11G
Henicognathus venustissimus Günther 1893: 144.
Scaphiodontophis venustissimus — Taylor and Smith 1943: 309.

Figure 11. Amphibian species present in Jaguas and San Carlos hydroelectric protected areas. **A:** *Dendrophidion percarinatum*. **B:** *Drymobius rhombifer* MHUA-R 15012. **C:** *Leptophis ahaetulla*. **D:** *Mastigodryas boddaerti* MHUA-R 15054. **E:** *Oxybelis aeneus*. **F:** *Phrynonax poecilonotus* MHUA-R 15013. **G:** *Scaphiodontophis venustissimus* MHUA-R 14871. **H:** *Spilotes pullatus.*

Material examined. Table 2.

Spilotes pullatus (Linnaeus, 1758): Figure 11H
Coluber pullatus Linnaeus 1758: 225.
Spilotes pullatus — Wagler 1830: 23.

This large snake reaches up to 2.5 m long. It differs from other snake species in the area by having a dorsal pattern of transversal yellow and black bands. Often, the posterior portion of the body is completely black (Savage 2002). It also differs from similar species in the region by having 14–18 dorsal rows of scales at the midbody with the uppermost keeled (Savage 2002).

Tantilla melanocephala (Linnaeus, 1758): Figure 12A
Coluber melanocephalus Linnaeus 1758: 218.
Tantilla melanocephala — Wilson and Mena 1980: 6.

Material examined. Table Appendix 2.

Atractus occipitoalbus (Jan, 1862): Figure 12B
Rhabdosoma occipitualbum Jan 1862: 16.
Atractus occipitualbus — Boulenger 1894: 310.

Material examined. Table 2.

Clelia clelia (Daudin, 1803): Figure 12C
Coluber clelia Daudin 1803: 330.
Clelia clelia — Zaher 1996: 301.

Coniophanes fissidens (Günther, 1858): Figure 12D
Coronella fissidens Günther 1858: 36.
Coniophanes fissidens —Pérez-Santos and Moreno 1988: 127.

Material examined. Table 2.

Erythrolamprus epinephelus (Cope, 1862): Figure 12E
Liophis epinephalus Cope 1862: 78.
Erythrolamprus epinephelus — Grazziotin et al. 2012: 21.

Material examined. Table 2.

Erythrolamprus melanotus (Shaw, 1802): Figure 12F
Coluber melanotus Shaw 1802: 534.
Erythrolamprus melanotus — Grazziotin et al. 2012: 21.

This medium-sized species may be recognized by having 17-17-15 smooth dorsal scale rows. Its dorsal ground color is light brown and yellowish, with 3 dorsal dark brown lines that extend from the neck to the tail. The 2 more lateral lines, running along the fourth and fifth dorsal rows, begin as series of points and the vertebral line one is about 5 scale rows wide (Dixon and Michaud 1992). Ventral coloration is white or light yellow (Dixon and Michaud 1992). The most similar sympatric species is *Erythrolamprus epinephelus*, which differs in having a grayish ground color with mainly transversal blotches or bands, 2 lateral dark lines that begin only in the posterior portion of the body extending to the tail, and frequently a reddish to yellowish venter with black blotches (Dixon 1983).

Erythrolamprus pseudocorallus Roze, 1959: Figure 12G
Erythrolamprus pseudocorallus Roze 1959: 530.

Material examined. Table 2.

Imantodes cenchoa (Linnaeus, 1758): Figure 12H
Coluber cenchoa Linnaeus 1758: 226.

Material examined. Table 2.

Leptodeira septentrionalis Kennicott, 1859: Figure 13A
Leptodeira septentrionalis Kennicott *in* Baird 1859: 16.

Material examined. Table 2.

Ninia atrata (Hallowell, 1845): Figure 13B
Coluber atratus Hallowell 1845: 245.
Ninia atrata — Cope 1860: 340.

Material examined. Table 2.

Ninia tereseitae Angarita-Sierra & Lynch, 2017: Figure 13C
Ninia tereseitae Angarita-Sierra and Lynch (2017): 478.

Material examined. Table 2.

Oxyrhopus petolarius (Linnaeus, 1758): Figure 13D
Coluber petola Linnaeus 1758: 225.
Oxyrhopus petolarius — Duméril and Bibron 1854: 1033.

Material examined. Table 2.

Rhadinaea decorata (Günther, 1858): Figure 13E
Coronella decorata Günther 1858: 35.
Rhadinaea decorata — Taylor 1949: 196.

Material examined. Table 2.

This small, brown snake has a white, black-bordered line that goes from the postoculars through the fifth and sixth dorsal rows to the tip of the tail. The vertebral region is a little paler than below the lines. Specimens of *Rhadinaea decorata* often have a subpreocular scale and 110–134 ventral scales (Myers 1974). The most similar species in the region is *Urotheca fulviceps*, which has a reddish or purple head band, a pale line running along the first and second dorsal scale rows and more than 136 ventrals.

Sibon nebulatus (Linnaeus, 1758): Figure 13F
Coluber sibon Linnaeus 1758: 222.
Sibon nebulatus — Fitzinger 1826: 60.

Material examined. Table 2.

This species has a pattern of gray, white and black bands. Gray bands are larger and with dispersed small black blotches, followed by a thin white band and then by a medium-sized black band (Savage 2002). Ventrally, ground is white with black blotches or bands. *Sibon nebulatus* has a large head and eyes like species of the genus *Imantodes*, but it can be easily recognized by its color pattern (Savage 2002).

Siphlophis compressus (Daudin, 1803): Figure 13G
Coluber compressus Daudin 1803: 247.
Siphlophis compressus — Zaher and Prudente 1999: 699.

Material examined. Table 2.

Urotheca fulviceps (Cope, 1886): Figure 13H
Rhadinaea fulviceps Cope 1886: 279.
Urotheca fulviceps — Savage and Crother 1989: 343.

Material examined. Table 2.

Xenodon rabdocephalus (Wied-Neuwied, 1824): Figure 14A
Coluber rabdocephalus Wied-Neuwied 1824: 668.
Xenodon rabdocephalus — Duméril et al. 1854: 758.

Micrurus dumerilii Jan, 1858: Figure 14B
Micrurus dumerilii Jan 1858: 522.

Material examined. Table 2.

Figure 12. Amphibian species present in Jaguas and San Carlos hydroelectric protected areas. **A:** *Tantilla melanocephala* MHUA-R 14855. **B:** *Atractus occipitoalbus* MHUA-R 15131. **C:** *Clelia clelia.* **D:** *Coniophanes fissidens* MHUA-R 14879. **E:** *Erythrolamprus epinephelus* MHUA-R 14841. **F.** *Erythrolamprus melanotus.* **G:** *Erythrolamprus pseudocorallus* MHUA-R 14856. **H:** *Imantodes cenchoa* MHUA-R 15134.

Figure 13. Amphibian species present in Jaguas and San Carlos hydroelectric protected areas. **A:** *Leptodeira septentrionalis.* **B:** *Ninia atrata* MHUA-R 14847. **C:** *Ninia teresitae.* MHUA-R 14860. **D:** *Oxyrhopus petolarius* MHUA-R 14843. **E:** *Rhadinaea decorata* MHUA-R 14859. **F:** *Sibon nebulatus* MHUA-R 15154. **G:** *Siphlophis compressus* MHUA-R 14733. **H:** *Urotheca fulviceps* MHUA-R 15132.

Micrurus mipartitus (Duméril, Bibron & Duméril, 1854): Figure 14C
Elaps mipartitus Duméril et al. 1854: 1220.
Micrurus mipartitus — Amaral 1926: 66.

Material examined. Table 2.

Trilepida macrolepis (Peters, 1857): Figure 14D
Stenostoma macrolepis Peters 1857: 402.
Trilepida macrolepis— Hedges 2011: 63 [by implication].

Material examined. Table 2.

This is a very small species that may be differentiated from other snakes by having body scales of the same size (without enlarged ventral), arranged in 14 rows around de body (Köhler 2008). It has 4 supralabial scales and 10 scale rows around the middle of the tail. Individuals are dark brown dorsally and lighter ventrally, with whitish scale borders (Pinto et al. 2010). *Epictia goudotii*, a species potentially sympatric with *Trilepida macrolepis*, has 2 supralabials, a darker color pattern with stripes, and a yellow rostral scale (Pinto et al. 2010).

Bothrops asper (Garman, 1883): Figure 14E
Trigonocephalus asper Garman 1883: 124.
Bothrops asper — Hoge 1966: 113.

Material examined. Table 2.

Porthidium lansbergii (Schlegel, 1841): Figure 14F
Trigonocephalus lansbergi Schlegel 1841: 1.
Porthidium lansbergii — McDiarmid et al. 1999: 320.

Material examined. Table 2.

Kinosternon leucostomum (Duméril, Bibron & Duméril, 1851): Figure 14G
Cinosternon leucostomum Duméril et al. 1851: 17.
Cinosternon postinguinale Cope 1887: 23.

Material examined. Table 2.

This small freshwater cryptodiran turtle is yellowish brown. It may be recognized by having a single carapace keel and the axillar and inguinal scutes usually separated, whereas *Kinosternon scorpioides* has 3 carapace keels and the axillar and inguinal scutes usually in contact (Köhler 2008).

Discussion

The 43 amphibian species recorded in this study represent 5.2% of the Colombian amphibian species (Frost 2016), and 15% of the species reported from the Cordillera Central in Colombia (IUCN 2016). The 58 reptile species represent 6% of the total Colombian reptiles species (Uetz and Hošek 2016), and 44% of the reptile fauna reported for the Cordillera Central. The Cordillera Central in Colombia is recognized for its high diversity in amphibians and reptiles (Lynch et al. 1997) and the 2 sites we studied represent a high proportion of this herpetofauna.

Fifteen (35%) of the amphibian species found during the monitoring are endemic to Colombia. Most of them are restricted to the eastern flank of the Cordillera Central: *Bolitoglossa ramosi*, *Dendropsophus norandinus*, *Diasporus anthrax*, *Epicrionops parkeri*, *Pristimantis fallax*, *Pristimantis jaguensis*, *Pristimantis viejas*, *Rheobates pseudopalmatus*, *Rulyrana susatamai*, and *Sachatamia punctulata*. The distribution of the other endemic species extends to the Magdalena river valley (*Microcaecilia pricei*, *Caecilia thompsoni* and *Craugastor metriosistus*), the Chocoan Pacific lowland (*Colostethus inguinalis*; Grant and Lynch 2004) or the Caribbean lowland and foothills of the Sierra Nevada de Santa Marta (*Dendrobates truncatus*). Among the reptiles, *Anolis sulcifrons* was the only recorded species with a distribution restricted to Colombia (Uetz and Hošek 2016).

Five records are of particular interest in this study. *Pristimantis jaguensis* is an endemic frog from Colombia, with only 1 known locality, the surroundings of the Jaguas hydroelectric project (Rivera-Prieto et al. 2014). *Hyalinobatrachium aureogutattum* is a frog previously recorded from the departments of Valle del Cauca, Risaralda, Chocó and Antioquia on the western flank of the Cordillera Occidental in Colombia, between 45 and 1570 m above sea level from the provinces of Esmeralda and Imbabura in Ecuador, and from the eastern cordilleras in southwestern Darién province in Panama (IUCN 2016). This is the first record of this species in the Magdalena river valley in Colombia. The presence of *Rhadinaea decorata* in Colombia was suggested by Myers (1974), and we present a voucher of this species from the San Carlos site, which thus represents the first verified record from Colombia. *Anadia ocellata* is distributed on both slopes of the cordilleras in Costa Rica and western Panama (Savage 2002). Batista et al. (2016) mention the occurrence in the Pacific lowlands of Colombia, contrary to Oftedal (1974), Savage (2002), and Köhler (2008), who indicated a southern range limit in Panama. We conservatively assign our voucher specimen from the Magdalena river valley to the *A. ocellata* group (sensu Oftedal 1974). The distribution of *Rhinella alata* in eastern cordillera was suggested by Pramuck (2006), although her observation lacked a voucher. Here, we present vouchers of *R. alata* that confirm the inter-Andean distribution of this species with records from Magdalena river valley.

Historically, the herpetofauna from the eastern side of the Andes has been considered very distinct from the trans-Andean region (Duellman 1979). Nevertheless, as part of the long-term sampling carried out in this study, we have recently reported on the occurrence of species distributed in the eastern flank of the northern Cordillera Central but previously known from the Amazon basin: *Atractus occipitoalbus* (Marin et al. 2017), *Anolis fuscoauratus* (Grisales-Martínez et al. in press) and *Cochranella resplendens* (Molina-Zuluaga et al. 2017). These findings urge the need for thorough sampling and a detailed taxonomic revision of species distributed in the Magdalena river valley to elucidate the biogeographic connection between both areas.

We were not able to assign 7 records to any valid species. The record of *Marisora* sp. (Figure 9F) may

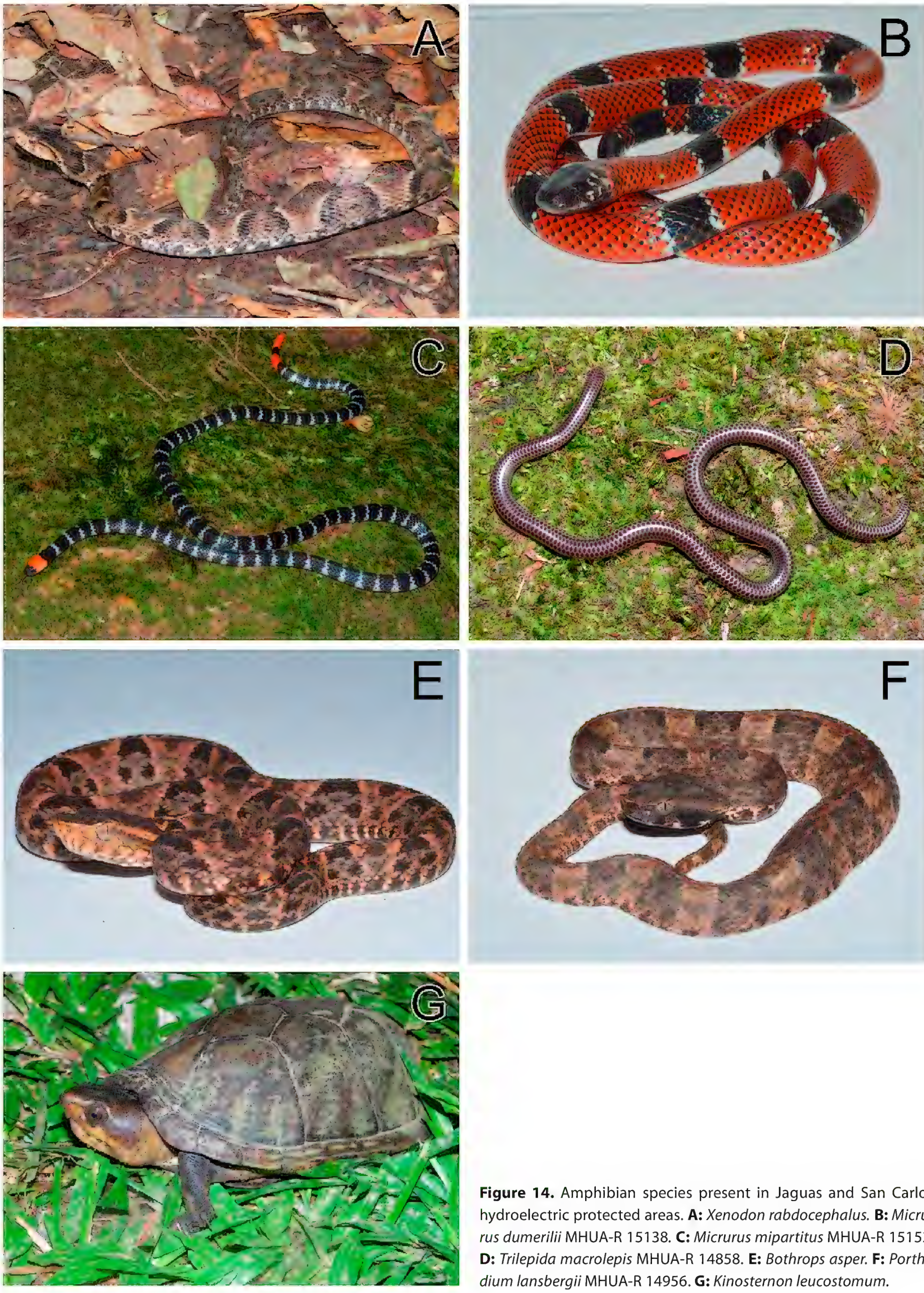

Figure 14. Amphibian species present in Jaguas and San Carlos hydroelectric protected areas. **A:** *Xenodon rabdocephalus.* **B:** *Micrurus dumerilii* MHUA-R 15138. **C:** *Micrurus mipartitus* MHUA-R 15152. **D:** *Trilepida macrolepis* MHUA-R 14858. **E:** *Bothrops asper.* **F:** *Porthidium lansbergii* MHUA-R 14956. **G:** *Kinosternon leucostomum.*

correspond to *Marisora* (*Mabuya*) candidate species IV suggested by Pinto-Sánchez et al. (2015). The second record refers to an *Ameiva* sp. In Colombia, there are 3 *Ameiva* species: *Ameiva ameiva*, *A. bifrontata*, and *A. praesignis* (Harvey et al. 2012). As we only have a specimen photograph (Figure 10B) we cannot assign it to any of these species. The vouchers of *Ptychoglossus* sp., *Sachatamia* sp., *Colostethus* aff. *fraterdanieli*, and *Cercosaura* sp. may represent undescribed taxa.

Pristimantis fallax is the only species reported in this

Table 3. Taxonomic list of amphibians reported in the Jaguas and San Carlos Hydroelectric protected areas. Asterisks indicate species endemic to Colombia. IUCN Conservation status: CR = Critically Endangered, EN = Endangered, VU = Vulnerable, NT = Near Threatened, LC = Least Concern, DD = Data Deficient; NE = Not Evaluated. Geographic distribution follows Lynch et al. (1997): A = Chocoan lowland forests, B = Caribbean lowlands and inter-Andean valleys, C = Llanos, D and E = Amazonia, F = Cordillera Occidental, G = Cordillera Central, H = Cordillera Oriental, I = Sierra Nevada de Santa Marta.

Taxon	Jaguas	San Carlos	IUCN	Distribution
AMPHIBIA				
ANURA				
Aromobatidae				
**Rheobates pseudopalmatus* (Rivero & Serna, 2000)	X	X	DD	G
Bufonidae				
Rhinella alata (Thominot, 1884)	X	X	DD	A
Rhinella horribilis (Wiegmann, 1833)	X	X	NE	A-B, F-I
Centrolenidae				
Cochranella resplendens (Lynch & Duellman, 1973)	X		LC	G, D-E,
Espadarana prosoblepon (Boettger, 1892)	X	X	LC	A–B, F-H
Hyalinobatrachium aureoguttatum (Barrera-Rodríguez & Ruíz-Carranza, 1989)		X	NT	A–B, G
Hyalinobatrachium fleischmanni (Boettger, 1893)		X	LC	A–B, F-H
**Rulyrana susatamai* (Ruiz-Carranza & Lynch, 1995)	X		VU	B, G
**Sachatamia punctulata* (Ruiz-Carranza & Lynch, 1995)	X	X	EN	B, G
Sachatamia sp.	X			
Craugastoridae				
**Craugastor metriosistus* Ospina-Sarria, Angarita-Sierra & Pedroza-Banda, 2015	X	X	NE	B
**Pristimantis fallax* (Lynch & Rueda, 1999)		X	VU	G
Pristimantis gaigei (Dunn, 1931)	X	X	LC	A–B, F-H
**Pristimantis jaguensis* Rivera-Prieto , Rivera-Correa & Daza, 2014	X		NE	G
Pristimantis penelopus (Lynch & Rueda, 1999)	X	X	VU	B, G–H
Pristimantis taeniatus (Boulenger, 1912)	X	X	LC	A–B, F–H
**Pristimantis viejas* (Lynch & Rueda-Almonacid, 1999)	X	X	LC	B, G–H
Dendrobatidae				
**Colostethus inguinalis* (Cope, 1868)		X	LC	A–B, G
Colostethus aff. *fraterdanieli*	X			
**Dendrobates truncatus* (Cope, 1861)	X	X	LC	A–B, G–I
Eleutherodactylidae				
**Diasporus anthrax* (Lynch, 2001)	X	X	DD	B, G
Diasporus gularis (Boulenger, 1898)	X	X	LC	A–B, F–G
Hemiphractidae				
Hemiphractus fasciatus Peters, *1862*	X		NT	A–B, F
Hylidae				
Boana boans (Linnaeus, 1758)	X	X	LC	A–I
Boana xerophylla (Duméril & Bibron, 1841)	X	X	NE	B–C, F–I
Dendropsophus ebraccatus (Cope, 1874)	X	X	LC	A–B, G–H
Dendropsophus microcephalus (Cope, 1886)	X	X	LC	A–C, G–I
**Dendropsophus norandinus* Rivera-Correa & Gutiérrez-Cárdenas, 2012	X		NE	G
Dendropsophus subocularis (Dunn, 1934)	X	X	LC	A–B, F–H
Hyloscirtus palmeri (Boulenger, 1908)	X	X	LC	A–B, F–H
Phyllomedusa venusta Duellman & Trueb, 1967	X	X	LC	B, G–I
Scinax sp.	X	X		
Scinax rostratus (Peters, 1863)	X	X	LC	A–C, F–I
Scinax ruber (Laurenti, 1768)	X	X	LC	A–I
Smilisca phaeota (Cope, 1862)	X	X	LC	A–B, F–G
Leptodactylidae				
Engystomops pustulosus (Cope, 1864)	X	X	LC	A–C, G–I
Leptodactylus colombiensis Heyer, 1994	X	X	LC	B–C, F–H
Leptodactylus fuscus (Schneider, 1799)	X	X	LC	B–I
Leptodactylus savagei Heyer, 2005	X		LC	B,F-G, I
CAUDATA				
Plethodontidae				
**Bolitoglossa ramosi* (Brame & Wake, 1972)	X		LC	G
GYMNOPHIONA				
Caeciliidae				
**Caecilia thompsoni* (Boulenger, 1902)	X	X	DD	B, G–H
Siphonopidae				
**Microcaecilia pricei*		X	LC	B,F
Rhinatrematidae				
**Epicrionops parkeri* (Dunn, 1942)		X	DD	G

Table 4. Taxonomic list of reptiles reported in the Jaguas and San Carlos Hydroelectric protected areas. Asterisks indicate species endemic to Colombia. IUCN Conservation status is shown for both: a global assessment and a national assessment (IUCN 2016/Morales-Betancourt et al. 2015). CR= Critically Endangered, EN = Endangered, VU = Vulnerable, NT = Near Threatened, LC = Least Concern, DD = Data Deficient; NE = Not Evaluated. Geographic distribution follows Lynch et al. (1997): A = Chocoan lowland forests, B = Caribbean lowlands and inter-Andean valleys, C = Llanos, D and E = Amazonia, F = Cordillera Occidental, G = Cordillera Central, H = Cordillera Oriental, I = Sierra Nevada de Santa Marta.

Taxon	Jaguas	San Carlos	IUCN (Global/ National)	Distribution
REPTILIA				
SQUAMATA				
SAURIA				
Corytophanidae				
Basiliscus galeritus Dúmeril, 1851	X	X	NE/LC	A–B, G
Corytophanes cristatus (Merrem, 1820)	X	X	LC/LC	A–B, G
Dactyloidae				
Anolis auratus Daudin, 1802		X	NE/LC	A–H
Anolis aff. *granuliceps*	X	X		
Anolis fuscoauratus D'Orbigny, 1837		X	NE/LC	
**Anolis sulcifrons* Cope, 1899	X	X	NE/NT	B, G–H
Anolis tropidogaster Hallowell, 1856		X	NE/LC	
Anolis vittigerus Cope 1862		X	NE/LC	A-B, G–H
Gymnophthalmidae				
Anadia gr. *ocellata* Gray, 1845		X	NE/NT	A–B, G
Cercosaura sp.	X	X		
Echinosaura palmeri Boulenger, 1911	X	X	LC/NE	A, G
Loxopholis rugiceps Cope, 1869		X	LC/LC	A-B, G-I
Loxopholis southi Ruthven & Gaige, 1924		X	LC/LC	A, G
Ptychoglossus sp.	X	X		
Phyllodactylidae				
Thecadactylus rapicauda (Houttuyn, 1782)	X	X	NE/LC	A–C, E, G–H
Polychrotidae				
Polychrus gutturosus Berthold, 1846	X	X	NE/LC	A–B, F–H
Scincidae				
Marisora sp.	X	X		
Sphaerodactylidae				
Gonatodes albogularis (Duméril & Bibron, 1836)	X	X	NE/LC	A–I
Lepidoblepharis xanthostigma (Noble, 1916)	X	X	LC/LC	A–B, G
Sphaerodactylus lineolatus Lichtenstein & Von, 1856		X	LC/LC	A–B, G
Teiidae				
Ameiva sp.	X	X		
Cnemidophorus lemniscatus (Linnaeus, 1758)	X	X	NE/NE	A–B, D–E, G
Holcosus festivus (Lichtenstein, 1856)	X	X	LC/LC	A–B, G–H
AMPHISBAENIA				
Amphisbaenidae				
Amphisbaena varia Laurenti, 1768	X	X	NE/LC	A–H
OPHIDIA				
Boidae				
Boa constrictor Linnaeus, 1758	X	X	NE/LC	A–C, E, G–H
Colubridae				
Chironius exoletus (Linnaeus, 1758)	X	X	NE/LC	A–H
Chironius grandisquamis (Peters, 1869)	X	X	LC/LC	A–B, F–G
Dendrophidion percarinatum (Cope, 1893)	X	X	LC/LC	A–B, F–G
Drymobius rhombifer (Günther, 1860)		X	LC/LC	A–I
Leptophis ahaetulla (Linnaeus, 1758)	X	X	NE/LC	A–I
Mastigodryas boddaerti (Sentzen, 1796)	X	X	NE/LC	A–I
Oxybelis aeneus (Wagler, 1824)	X	X	NE/LC	A–H
Phrynonax poecilonotus (Günter, 1858)	X	X	LC/NE	A–B, F–H
Scaphiodontophis venustissimus (Gunther, 1893)		X	LC/NE	G
Spilotes pullatus (Linnaeus, 1758)	X	X	NE/LC	A–I
Tantilla melanocephala (Linnaeus, 1758)		X	NE/LC	A–C, E–H
Dipsadidae				
Atractus occipitoalbus (Jan, 1862)	X		NT/NT	E, G
Clelia clelia (Daudin, 1803)	X	X	NE/LC	A–I
Coniophanes fissidens (Gunther, 1858)	X	X	NE/LC	B, F–G
Erythrolamprus epinephelus (Cope, 1862)		X	NE/LC	F–I
Erythrolamprus melanotus (Shaw, 1802)		X	LC/LC	A–I
Erythrolamprus pseudocorallus Roze, 1959	X	X	LC/LC	B, G–H
Imantodes cenchoa Linnaeus, 1758	X	X	NE/LC	A–H

Continued

Table 4. *Continued.*

Taxon	Jaguas	San Carlos	IUCN (Global/ National)	Distribution
Leptodeira septentrionalis Kennicott, 1859	X	X	NE/LC	A–B, F–H
Ninia atrata (Hallowell, 1845)	X	X	LC/LC	B–C, E–H
**Ninia teresitae* Angarita-Sierra & Lynch, 2017		X	NE/NE	B
Oxyrhopus petolarius (Linnaeus, 1758)	X	X	NE/LC	A–H
Rhadinaea decorata (Gunther, 1858)	X	X	NE/NE	G
Sibon nebulatus (Linnaeus, 1758)	X	X	NE/LC	A–C, F–I
Siphlophis compressus (Daudin, 1803)		X	LC/LC	A–E, G
Urotheca fulviceps (Cope, 1886)		X	NE/DD	A–B, H
Xenodon rabdocephalus (Wied-Neuwied, 1824)		X	NE/LC	A–B, E–H
Elapidae				
Micrurus dumerilii Jan, 1858		X	NE/LC	A–B, F–I
Micrurus mipartitus (Duméril, Bribon & Duméril, 1854)		X	NE/LC	A–B, F–I
Leptotyphlopidae				
Trilepida macrolepis (Peters, 1857)		X	NE/LC	A–B, D–E, G–H
Viperidae				
Bothrops asper (Garman, 1883)	X	X	NE/LC	A–B, G–H
Porthidium lansbergii (Schlegel, 1841)	X	X	NE/LC	A–B, F–H
TESTUDINES				
Kinosternidae				
Kinosternon leucostomum (Duméril, Bibron & Duméril, 1851)	X	X	NE/LC	A–B, G–H

study included as Vulnerable at the country level in the Resolucion 192 del 2014 del Ministerio de Ambiente y Desarrollo Sostenible. At the global level, *Sachatamia punctulata* is listed by the IUCN as Endangered because its extent of occurrence is less than 5000 km^2, its distribution is severely fragmented, and there is a continuing decline in the extent and quality of its habitat (IUCN 2016). *Pristimantis fallax*, *P. penelopus* and *Rulyrana susatamai* are listed as Vulnerable because of continuous decline in the extent and quality of their habitat (Castro et al. 2004, IUCN 2016). Lastly, 2 species are categorized as Near Threatened: *Hemiphractus fasciatus* Peters, 1862 and *Hyalinobatrachium aureoguttatum* (Coloma et al. 2008, Solís et al. 2010; Table 3).

Recently, the conservation status of Colombia's reptiles has been assessed and 43 species are now under one of the 3 threat categories (Morales-Betancourt et al. 2015). However, none of them correspond to species present in our study areas. It is well known that reptiles around the world are declining due to a number of causes directly related to human activities (Gibbons et al. 2000). In addition to habitat loss and degradation, another threat is present in Colombia: the cultural view that reptiles, in particular snakes, are dangerous and nasty animals that should be exterminated (Castaño-Mora 2002, Lynch 2012). This view has probably driven several snake species to the brink of extinction at least locally (Lynch 2012).

To build complete species lists for Colombian amphibians and reptiles evokes large challenges for the following reasons: (1) the high levels of species diversity of amphibians and reptiles in the area, (2) the extreme cryptic diversity in several genera (e.g., *Pristimantis*, *Anolis, Atractus*), and (3) the lack of well-identified reference collections. However, continued specimen collection throughout different seasons and years in a specific locality will give us a better picture of the regional diversity and will impact future studies aiming to understand the origin and maintenance of this rich fauna.

The high species density, high representativeness of the regional biodiversity, and the high levels of amphibian endemism make these 2 private protected areas very important for conservation of the regional herpetofauna. As shown here, compensation areas of large infrastructure projects (i.e., hydroelectric projects) represent a potential opportunity to preserve the already highly degraded ecosystems in the northern Andes of Colombia.

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Authors' Contributions

AR, CMZ and JMD conceived the idea and wrote the text. JMD, CMM and JPH confirmed the taxonomic identity of all specimens.

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